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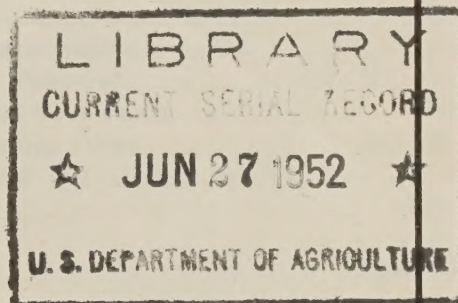
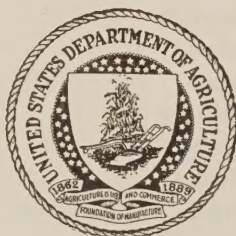
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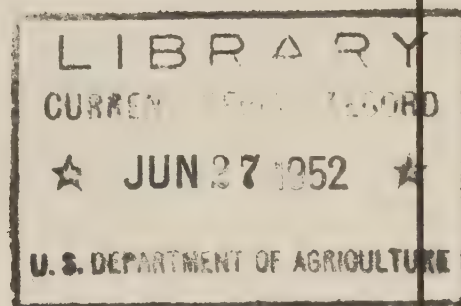
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An aerial photograph of a rural landscape. The image shows a patchwork of agricultural fields in various shades of brown and tan, separated by dark lines representing roads or fences. A small cluster of buildings, including a house and several barns, is situated in the lower-left quadrant. A line of trees runs horizontally across the middle of the image. The overall perspective is from a high angle, looking down on the land.

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CHIEF, SOIL CONSERVATION SERVICE

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☆ THIS MONTH ☆

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WELLINGTON BRINK
Editor
Art Work by
W. HOWARD MARTIN

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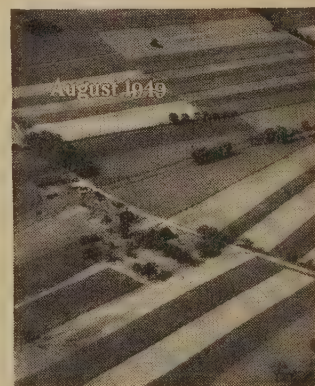
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FIRE INSURANCE.—When Thomas W. Wilson, cooperator in the Prince Georges Soil Conservation District, built a spring-fed pond on his dairy farm near Largo, Md., about 2 years ago, fire protection was the main thing he had in mind. He got results a recent Sunday afternoon when smoke appeared in a barn where 24 cows were being milked. Ten fire-fighting companies from nearby communities responded. Five started to pump from the 1¼ million gallons of water in a ½-acre pond of 10-foot depths. Seven hours later the last of the pumpers quit throwing water and left.

“Three barns and several smaller buildings valued at more than \$12,000 were saved. Without the pond and its water, all of them likely would have been lost. Three days later the water in the pond was back to normal level,” Wilson says. He spent \$850 for the pond. In one afternoon and evening he got it all back, with interest.

INCENTIVE.—In Vermont the Poultney-Mettawee Soil Conservation District supervisors have agreed to pay their bulldozer operator a \$100 bonus for this year if he operates the bulldozer 1,000 pay-hours during the season, a \$200 bonus if he goes over 1,100 pay-hours, and a \$300 bonus if he exceeds 1,300 pay-hours.



FRONT COVER.—This is the interesting pattern taken by conservation on the gently sloped fields owned by Ray Phillips near Dalmatia, in Stone Valley, Northumberland County, Pa. The photo was made by Hermann Postlethwaite.

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SOIL CONSERVATION

in the
Land of the Lei

Typical ranch scene on east coast of Molokai. It makes obvious why range conservation is essential to the livestock industry of the Hawaiian Islands.

By J. H. CHRIST

JAPANESE bombs in 1941 brought an abrupt halt to soil conservation work on the Hawaiian Islands. But they failed to obliterate the interest in soil conservation aroused a few years before by Dr. N. E. Winters and his technical staff of the Soil Conservation Service. Hawaiian pineapple and sugarcane producers, livestock operators, and truck farmers were ready to move ahead with the conservation job as soon as the smoke cleared away.

I made my first inspection trip to the territory last April and found that the soil conservation idea has spread to an extent that bodes well for the future of Hawaiian agriculture.

NOTE.—The author is regional conservator, Soil Conservation Service, Portland, Oreg.

In many ways my visit was a bewildering experience. I learned about flies that cause erosion, and about a new conservation practice known as "pineapple-stump mulch." Here, too, I saw soil conservation as a byproduct of sugar refining, rotation grazing by the simple expedient of turning a faucet, and soils that could well furnish the pigment for paint. I learned of areas that had become unprofitable for pineapple and sugarcane production. And I found a widespread determination on the part of land users, both large and small, to prevent any further inroads on their limited supplies of productive land.

Evidence of the move toward soil conservation is apparent throughout the Islands. Molokai, one of the large pineapple-producing islands in the territory, is now a complete soil conservation district. The Olinda-Kula Soil Conservation Dis-

trict on the island of Maui and the Waimanalo District on Oahu are forerunners of numerous other districts now in formation under the districts law recently adopted by the Territorial Legislature.

The western end of Molokai is largely occupied by a large livestock enterprise, the Molokai Ranch Co. In former years, this ranch was stocked with as many as 17,000 head of sheep. During certain seasons of the year vicious horn flies attacked the sheep and drove them to the windy points and open faces of the island. Here the animals stamped the ground to kick up dust which kept the flies away. Ranch officials told me that much of the erosion now in evidence was directly attributed to this activity.

My introduction to the unique pineapple-stump mulch also came on Molokai. For many years pineapple producers have grappled with the problem of what to do with the heavy, coarse stumps remaining from pineapple harvest. More than a year ago I had heard of an implement that completely buries the stumps following harvest and I was eager to see it in operation. I was told, however, that developments on the implement had been discontinued in favor of a new machine then being tested which would windrow the stumps on the surface in the inter-row area, fertilize the soil, apply soil disinfectant, and lay paper for subsequent pineapple planting.

Although the machine was not available for inspection, officials of a canning company showed

me photographs of the implement and described its operation. They showed me tests where moisture conditions under the stump mulch were as favorable as under the paper. This practice provides for an immediate planting after the crop has been removed instead of waiting a 12-month period for the pineapple residues to disintegrate. Service technicians are unusually optimistic as to the value of the practice for both soil and water conservation.

As in the case of numerous other soil conservation practices coming into use in the Islands, pineapple-stump mulch appears to be a potential money-saver as well as soil-saver. Two large packing companies are confident that stump mulch will shortly make it possible to add another full crop to the present production schedules. Both companies are taking active part in the affairs of the Molokai Soil Conservation District and are carrying forward extensive independent research at considerable expense.

After my experience with horn flies that cause erosion and pineapple-stump mulch, I was hardly surprised to find that soil conservation here is sometimes actually a byproduct of sugar refining. The unusual was becoming commonplace. At the Waialua sugar refinery, on the island of Oahu, a large settling tank measuring 120 feet in diameter has been constructed to catch the water used for washing cane brought in from the fields. Inasmuch as large quantities of soil cling to the cane, silt accumulation in the tank is considerable.



Soil-saving terraces constructed before the war.



Litter left on field after hand-cutting sugarcane. Under the common "grab" method of harvesting, the cane plants with large quantities of soil clinging to the roots are hauled directly to the refinery, where in some cases the soil is being recovered and returned to the fields.

A huge rotating arm collects this silty sludge from the bottom and conveys it to an adjacent basin. From there, it is very carefully returned by truck to portions of fields most seriously eroded or in need of soil additions.

A soil-recovery plant identical to the one operated by the Waialua refinery is nearing completion at the Ewa Sugar Plantation, and on the island of Maui, I later encountered yet another such installation.

The installations, which represent investments running to \$100,000 and more, are known as "hydroseparators." Their original purpose was to remove soil and debris from the wash water so that it could be reused for irrigation without clogging the irrigation systems. After a short period, however, their value for soil recovery also became apparent. Estimates of the amount of soil thus saved ranged as high as 35 to 40 acre-feet per year for installations on Oahu. Water savings are put at approximately 6,000,000 gallons during a cane-harvesting season. A further benefit of great importance is the elimination of beach pollution which has long been a problem to health authorities on the Islands.

Although pineapple production dominates the agriculture of Molokai, there is considerable livestock on the steeper slopes and other lands unsuited to pineapple culture. The Puuohoku Ranch on the northeast coast is fairly typical of much of the range land on the Islands. It is well managed, with ample stock water provided at strategic points through a vast network of pipes laid on the

surface of the ground. Rotation grazing is accomplished by the simple expedient of turning off a faucet which stops the water at any particular place and forces stock to move to another pasture. Large areas of range land in the Territory need improving and efforts toward this end are being made by many far-sighted ranchers.

Throughout the Territory, there is need for improving ranges and pastures with better forage plants. Good progress is being made in selecting the more desirable species and in determining the conditions under which they are adaptable.

Soil structures are highly complex. On Oahu, many of the soils are derived from lava, others from coral, and still others from a combination of the two. Large areas are exceedingly stony and frequently very shallow. Those derived primarily from coral appear to have a high clay fraction that causes them to plow up in hard, angular blocks. For the pineapple and sugarcane producers this is of little consequence. But for the small operator with light equipment, it greatly increases the difficulty of farming.

From my brief examination of the soils of Molokai, I learned of a farming hazard that was new to my experience. The soils here are among the reddest I have ever encountered. Farmers and visitors must be careful to soak their clothing in cold water before putting it in the family wash. Otherwise, the red pigment from the soil forms a very effective and permanent dye. The pigment sets quickly in hot water.



Hydroseparator in operation at a large refinery on the island of Oahu. Settling basin measures 120 feet across; total cost of installation, approximately \$100,000.

Agriculture on the island of Kauai at the extreme northern end of the Hawaiian chain offers a striking contrast to that of the lower islands. While considerable acreage is devoted to pineapple and sugarcane, the agriculture of the island seems more nearly geared to meet local needs. Diversified agricultural enterprises such as truck gardening, fruit production, dairying, beef cattle and related activities are common.

Erosion on Kauai is a problem of immediate concern of both large and small operators. Terrace systems, installed in the past, have not functioned well due to changes resulting from mechanization and there is need for modification of terrace design.

There is evidence of land abandonment in Hawaii because of soil losses by erosion. Some of this is due to the natural unsuitability of the land for the crops grown, as well as from the practices used in growing the crops. The topography is such that conservation treatment is a first requirement for a permanent agriculture. There is little land now available for development for cultivated crops. This limitation in itself is sufficient to enlist the efforts of all operators toward conservation of the lands now in use.

The need for technical assistance in applying conservation work is no less acute than in the continental United States. Soil conservationists now working in the Islands are heavily overburdened. Requests for technical guidance far exceed the ability to meet them. In some districts, opera-

tors unwilling to wait for assistance are installing conservation measures copied from a neighbor. In one instance I found terraces built in this fashion which unfortunately drained the wrong way.

As new districts form in the Territory, there is reason to believe that Hawaiian agriculture will quickly make up for the time lost during the war as it speeds ahead on soil conservation.

UNITED NATIONS SCIENTIFIC CONFERENCE.—The United Nations Scientific Conference on the Conservation and Utilization of Resources will open a 3-week session at Lake Success on August 17.

Among those from the Soil Conservation Service who will appear on the program are: H. H. Bennett, chief; J. C. Dykes, assistant chief; L. A. Jones, chief, water conservation and disposal practices; F. G. Renner, chief, range division; and E. H. Graham, chief, biology division, Washington, D. C.; T. S. Buie, regional conservator, Spartanburg, S. C.; and F. L. Duley, research, Lincoln, Nebr.

More than 400 scientific papers will be discussed at 60 section meetings of the conference where specialists from all over the world will exchange technical experience on specific subjects concerning the conservation and use of minerals, fuel and energy, land, water, forests, and wildlife and fish.

In addition, the conference will hold some 18 plenary meetings to discuss the inter-relationship of these specific resources and techniques. In the preparation of papers and in the discussions, emphasis will be placed on "the economic costs and benefits" of improved resources techniques.

Outstanding scientists, experts, and technicians from more than 70 countries have been invited to attend this first scientific conference to be held by the United Nations.



A proud Chief assembles his Honor Award winners in his office following the ceremony on the Monument Grounds. Standing behind him, left to right: Chandler, Heath, McCulloch, Flanagan, McLaughlin, and Allred.

TOP SELECTIONS OF 1949.—Six individual employees of the Soil Conservation Service were accorded national recognition for outstanding contributions to American agriculture at the annual Honor Awards Ceremony of the Department of Agriculture in May. Presentation was made by Secretary Brannan, following an address by Senator Elmer Thomas, before a large and enthusiastic audience in the outdoor Sylvan Theater in Washington, D. C.

Similar awards for group achievements will be made later to the Broken Arrow (Okla.) Work Unit and the Hamilton (Tex.) Work Unit at their field headquarters offices.

Superior Service Awards, each attested by certificate, medal, and lapel button went to the following:

Berten W. Allred, Fort Worth, Tex. For outstanding service to agriculture in the development of improved procedures and working methods in the field of range conservation which have resulted in significant savings in money and time of personnel.

Verlin N. Chandler, Tucson, Ariz. For unusual skill, ingenuity, and accomplishment in reconstructing and modifying standard equipment, ranging from scientific to heavy farm equipment, required for carrying out improved methods in range cover and erosion control in the semiarid areas of the Southwest.

Robert C. Flanagan, Senatobia, Miss. For outstanding leadership and competence in developing a highly effective soil conservation program in Tate County, Miss.

Maurice E. Heath, Big Flats, N. Y. For outstanding service to agriculture through his assistance in helping to find and isolate the southern type of brome grass strains and for his efforts in further developing vegetative control in soil conservation.

Allan W. McCulloch, Portland, Oreg. For outstanding achievement in the field of irrigation.

Walter Wesley McLaughlin, Berkeley, Calif. For outstanding achievement in the field of irrigation, national and international.

PIN THOSE ISLANDS DOWN!—Ernest G. Holt, research specialist of the Soil Conservation Service, has begun a year's assignment with the Navy as conservation officer, Trust Territory of the Pacific Islands. Friends may reach him at the following address: Staff, DepHiCom-TerPacIs, Navy No. 926, % Fleet Post Office, San Francisco, Calif.

10-YEAR CROP.—A Series E Savings Bond purchased at a cost of \$750 will grow to \$1,000 in 10 years, come wind, come rain. How much does it take in farm products to make this investment in the future? Someone has worked out an interesting table on this, based on average prices received by farmers:

Product	1932	1939	1949
	yearly average	yearly average	February
Hogs (200-pound)-----	112	60	20
Cattle (1,000-pound)-----	18	10	4
Milk (hundredweight)-----	586	446	173
Eggs (cases)-----	176	144	60
Wheat (bushels)-----	1,964	1,085	386
Corn (bushels)-----	2,374	1,321	670
Cotton (bales)-----	23	16	5
Tobacco (pounds)-----	7,143	4,871	1,531
Potatoes (bushels)-----	1,974	1,076	436
Apples (bushels)-----	1,229	1,172	253

LITTLE GIRL IN MAN-SIZE JOB

BY HUGH F. FAMES

MAKING SOIL CONSERVATION SURVEYS for the Soil Conservation Service calls for a husky, long-legged man who can get over a lot of acres on foot and twist a 6-pound soil auger 2 or 3 feet into the ground and pull it out with samples at least 100 and maybe 200 times a day.

It is a back-breaking one-man job, even when one knows how to apply the coordinated strength of one's whole body in the auger-pulling effort. Occasionally, as when making deeper borings in the site for a farm pond, there may be need for the help of another man in handling the auger and its extension, but most of the time one works alone.

But it's not too tough a job for Mary Baltz. For 4 years now, in New York's Oneida, Madison, and Lewis Counties, the 120-pound, 5-foot 3-inch, 25-year-old Mary has been doing this kind of thing day after day and week after week, in all kinds of weather and at all seasons of the year. And, regularly, she has been earning a very high efficiency rating for the quality and quantity and all-around acceptability of her work.

When Mary Baltz, majoring in agronomy, came out of college in 1945, after 3 years at Antioch College, and a year of special study at Cornell University, with a degree and some extra training received elsewhere, she picked soil conservation surveying with SCS as the job she wanted most to do. Enthusiasm for it had been engendered 10 years earlier when an uncle, Harold C. Squires of Lake Keuka, N. Y., a vineyardist, took her to an open house at the agricultural experiment station at nearby Geneva. There she became sold on the idea of some day working with soils. Supervisors tried to ease her into an office job, but she insisted on field work and got it. They have never been sorry that they let her have her way. Mary has never been sorry that she was a bit stubborn about getting field work.

In this central New York assignment Mary Baltz has been doing all the conservation surveying for seven farm planners who work with the soil conservation districts there. It's a heavy work load, because 291 farmers asked for assistance

from the 3 districts in 1948. Since districts were organized under State law, 1,581 farmers have been assisted with complete farm conservation plans. In developing each of these plans, the job that Mary Baltz does is the first requirement. She has not made all of the conservation surveys involved, but she has done the basic work for most of the plans and for many others that will be developed later. Because the work load is so heavy, another surveyor has recently been assigned to handle the work for the Lewis County planner. Mary will do the surveying for the six in Madison and Oneida Counties.

Soil conservation surveying is a complicated task in this three-county area because the soil scientist—that's what Mary is officially designated—is required to deal with an unusually large number of soil types. There are six major land-resource areas, each with different types of soil-forming rocks. Soil scientists, whether they are "splitters" or "lumpers," have a lot of difficulty with these many varying types. Mary Baltz has been unusually successful because of her ability to sift out quickly those having particular significance to agriculture.

Mary works out of the Madison County Soil Conservation District office. There she did her first field work on the highly productive Canastota "muck" areas, among the best in the country. There she had the advantage of early training under the watchful eyes of Jim McDonald, an old-timer who made a special effort to see that Mary got started right. Jim is working for SCS in the southeast now, but he still smiles broadly when you mention Mary Baltz. He "always knew she would come through with flying colors."

Miss Baltz is a native of Chickasha, Okla., but grew up in Baltimore, where she was graduated from Eastern High School. After 3 years' study at Antioch, she took a year's leave of absence and entered Cornell for special courses in agronomy, after which she went to work for SCS. On the basis of all this work and completion of other requirements while working for SCS, she received her Antioch degree in 1946.

Antioch has a program in which theoretical study is alternated with practical work. In the practical phase of this program the college obtains jobs that are generally closely related to the field in which the student is majoring. During this process Mary, after her freshman year, worked for a year as a technician at the Connecticut Agricul-

NOTE.—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.



This is Mary Baltz

tural Experiment Station where she got experience in quick soil-testing, analysis of forest-soil samples, testing of plant-tissue samples for nutrients by a colorimetric method, and field work with forest soils.

Next year she worked 3 months in the master analysis division of the United States Weather Bureau at Washington, D. C. She plotted weather data on maps much as she was later to plot land conditions on aerial maps. Later on, the same year, she got herself a 4-month job, still under the college program, at the Eastern States Farmers' Exchange at West Springfield, Mass., where she did quick-testing analyses of soil and hay samples.

"All business; no foolishness" is a phrase that has been applied to Mary Baltz. It helps you understand how she is carefully plotting her course toward an end. It explains why she studied engineering drawing at the New Haven YMCA Junior College in 1943, and why she has taken night school courses in photogrammetry and logic at Syracuse University. It also explains why steady advancements with ever-increasing responsibilities have come to Mary Baltz since she started with SCS as a soils aid, and helps one understand why she has become a P-2 soil scientist—and the only woman in the Nation doing soil conservation surveying for SCS.

Studying, identifying, classifying, and recording soil, slope, erosion, and land-use conditions in the field is not everything that Mary does. When the snow and ice are on the ground and fieldwork cannot be done by anyone, and at other times when she can temporarily shift from fieldwork, Mary has been doing particularly exacting work in reconciling data gathered in independent surveys previously made by others in parts of the area, and transferring it to the standard legend set up for SCS use in the three districts. For several months she has been supervising the work of a 4-girl map-measuring unit at the Canastota office. The purpose is to acquire acreage figures from conservation-survey maps for soil, slope, and erosion conditions in relation to different land uses. Acreages are obtained by cutting copies of these maps, weighing pieces that are alike, and converting this weight to acres. The data thus obtained are used in long-range planning for the type of conservation measures needed in an area.

Back in the days when Mary was angling for a soil conservation surveying job, there were skeptics who seriously doubted the wisdom of putting a girl

to work on that kind of an assignment. It just couldn't work out for the good of Mary, or the SCS, or the farmer-cooperators, they said. But they were wrong. Through her professional ability and her thoughtfulness, courtesy, dependability, and leveling influence, Mary has been able to adjust herself to many varying conditions. With these qualities, plus her insistence that at all times she is to be considered only as a fully participating member of the team who can handle a soil auger and do the whole soil conservation surveying job as well as any other technician, Mary Baltz has established herself solidly among people with whom she works.

After nearly 4 years of experience in soil conservation surveying, what does Mary Baltz see ahead? She puts it this way:

"It seems to me that the most important single job to be done now in agriculture is the conserving of soil resources through correct land use and other correlated measures.

"The attitude of farmers toward soil and water conservation and good land use is rapidly changing. During the past few years, particularly in northern Madison County, I have noted this shift in opinion. Farmers used to ask for help mainly in drainage work or pasture clearing. Now they want to discuss and try out strip cropping, diversions, etc. I believe the publicity given to soil conservation farming by newspapers, magazines, radio, and the Department of Agriculture programs has had a big part in bringing this change in attitude. I like the work I am doing, and have no plans for the immediate future except to stay with my job, because I think it is important."



GOOD IDEA CATCHES ON.—The Upper West Red River and Upper Sabine Soil Conservation District (La.) boards of supervisors have voted to supply new cooperators with a 1-year subscription to SOIL CONSERVATION Magazine. The plan is to have a bank, farm-implement dealer, seed store, or other friends in town agree to underwrite the project. The first copy of the magazine mailed to a new subscriber is to have attached to it a letter of greeting and explanation.

SCIENCE STUDIES

A Gully

By

RUSSELL WOODBURN

Erosion has bitten away the soil and left the plugs, at least some of them. Others have been tumbled downhill and been broken or battered to pieces by rushing waters.

FOR SPECTACULAR soil erosion on agricultural land, it is hard to find any place in the United States that excels the hill country of north central Mississippi. In the Little Tallahatchie watershed,

NOTE.—The author is project supervisor, Office of Research, SCS, State College, Miss.

lying in the middle of this area, 294,000 acres have been forced out of cultivation by soil erosion since white man began farming there scarcely a century ago. That's about one-third of the entire watershed. Some 75,000 acres have been ruined for agriculture by large, deep gullies.



General view of gully immediately after plugging.



Typical air view of the land under study. This is decay of land at its worst—a countryside pockmarked with creases and cuts which lengthen and spread with every lash of the weather.

Besides destroying this vast acreage of sloping land, major gullies have produced enough sand to fill literally hundreds of miles of minor waterways and tributary stream channels. Because the capacity of channels has been so greatly reduced, the runoff from a $\frac{1}{2}$ -inch rain now leads to damaging floods. Flood damage, indeed, now occurs on about 65 percent of the 71,800 acres of bottom land in the Little Tallahatchie watershed. In a normal year about 15 floods occur somewhere in the watershed, of which 4 normally take place during the growing season. The Department of Agriculture's flood-control survey of the Little Tallahatchie in 1940 estimated the annual flood-water damage to crops at \$301,000 and the damage from infertile overwash and swamping on agricultural bottom lands at \$591,000. Increased agricultural prices and land values today bring the average annual losses to more than double these figures.

A major part of the flood and sedimentation costs can be traced directly to the severe gullying. Sand is moving rapidly out of the major gullies. When it reaches the lower gradients of the minor waterways and stream channels, the flow can no longer transport it in such large amounts. Consequently, many of the channels have been filled

to a level even higher than the normal ground level. Often water now flows down along the sides of the valley, rendering all of the bottom land unfit for farming.

One of the difficulties in planning effective gully control has been the lack of data on the rate of erosion by direct slope wash within the gully. Experimental data have been obtained in many States on rates of sheet erosion, but very little information is available on the rate of soil loss from gullies alone. In order to obtain quantitative data which could be used in planning erosion-control and sediment-control measures, the Soil Conservation Service started a research study in 1936 on a typical large gully located about 3 miles northwest of Oxford in Lafayette County, Miss. This type gully is 20 to 40 feet deep and has an area of approximately seven-tenths of an acre. Practically no water flows into it, as the head of the gully is less than 100 feet from the drainage divide. Therefore, almost all of the erosion within the gully can be attributed to raindrop impact and slope wash. Lexington silt loam soil that once covered the gully was developed on a 4- to 5-foot thickness of loessal material which overlies the loosely consolidated Holly Springs sand, an extremely friable and loose-textured geologic forma-

tion. Once erosion has cut through the upper layer of loess the sandy material is eroded with extreme rapidity. Often it seems to melt like sugar and flow away like grainy syrup.

As a first step in the research, a 2-foot contour map was made of the entire gully. On each 2-foot contour 4-inch diameter holes were bored to a depth of 30 inches at right angles to the gully face and at intervals of 10 feet along the contour. These holes were filled with concrete, which was carefully scraped off flush with the slope of the gully. Each of the 1,518 concrete plugs thus formed was numbered on its face. Plugs were set in the bottom of the gully as well as along the surface of the ground beyond the gully rim. The outer end of each plug thus constituted a fixed point from which the depth of soil removed in its vicinity could be measured.

The length to which each plug protruded was measured in 1937, 1 year after installation, and

again in 1939, 3 years after installation. Measurements were again made on all the surviving monuments in January 1949, 13 years after their installation. Many of the plugs were gone, which indicated an erosion of at least 30 inches at these points. From a sufficient number of surviving plugs, however, a reliable determination could be made of the total amount of soil removed.

The average width of the surface slope between contours was calculated from the area between contours and the average length of contours. This value multiplied by the mean length of protrusion above the surface of all plugs on the upper and lower contours gave the volume of soil removed in this contour interval. The calculations showed that during the first year (1936-37) 2,973 cubic feet of soil went out of the gully; in the first 3 years (1936-39) 11,478 cubic feet was removed;

(Continued on page 22)



Cattle and tractors crossed under Mississippi State Highway 6 at West Goose Creek until 3 years ago. Sand is now within 2 feet of bridge.



Land reclaimed by siltation upstream from earth dam. Farming practices already are being carried out. (Photo by Brisighella Mountain Basins Consortium.)

ITALY'S MAJOR LAND PROBLEM

By AUGUSTO ALFANI AND HUGH G. CALKINS

PART II

EDITOR'S NOTE.—The authors continue in this issue the fascinating and stimulative story begun in July. Part II describes in detail certain Italian land-restoration measures which in many instances are contrary to those favored in the United States. We can neither accept nor challenge them, for soils and economics and climatological conditions are sharply different from those prevailing here. This is factual reporting, well done.

AS INDICATED earlier, it is believed that most of Italy's clay formations had a covering of sandy soil, and supported forests. When the forests were cut and burned the sandy layer was washed off and tree growth was no longer able, unaided, to gain a foothold in the clay. Now the layman, looking at a stupendous example of erosion, immediately jumps to the conclusion that

reforestation is the quickest and most practical solution. The conservation specialist says "no," first because Italy cannot afford to forego the use of land that can be made to produce food crops, and second, because reforestation technically is not considered a sound method of reclaiming damaged clay lands.

The technical arguments are several: It is very difficult to get a plantation started in relatively impermeable soil. Once the trees are started their deep root systems carry water to lower strata and greatly increase the danger of land slides. In order to establish a plantation on ragged slopes it is generally necessary to introduce expensive measures to stabilize the slopes; these measures are not a guarantee against future damage. To be safe, it is often necessary to resort to more or less the same costly process required to establish food crops or forage plants. Leguminous forage plants, moreover, have the advantage of improving the soil more rapidly and effectively than trees.

Briefly, the question resolves itself into making the agricultural development of each project area

the first objective, and limiting reforestation to those sites within the area where soil and other conditions are more favorable to trees than to field crops. Every watershed stands to benefit, physically and economically, from a fair proportion of forest or wood lots. One of Italy's foremost foresters considers that eucalyptus (*E. rostrata*) is well adapted to the raw clay lands of Sicily, but not to the colder climates of the north, where elm,

they can at other seasons. All untilled areas in the clay regions are subject to indiscriminate grazing. Heavy use of grasslands weakens the vegetation and makes the land more susceptible to erosion. Cattle and sheep trails have a similar effect. The problem would be considerably lessened if grazing were controlled. In some parts of the country, improved pastures under fence alternating with cultivated crops would help.



Sodded earth dam with overflow crest normally used in Val d'Era. The spontaneous vegetation developed on the silted plain upstream from dam shows that the silted soil is fertile. (Photo by Val d'Era Reclamation Consortium).

ash, and cypress offer greater possibilities. Tamarisk is specically useful in connection with engineering structures in virgin clay.

A problem closely related to forestry is that of grazing. Every tenant farmer has a few cattle for work and milk and many have small bands of sheep. In the central and southern Appenines large and small sheep owners take their flocks to the mountains in the summer, and forage where

Elsewhere, the only solution seems to be to regulate the number of animals and seasons of use in accordance with a plan based on careful surveys. A lot of educational effort would be needed to overcome resistance to such a scheme.

As already noted, gullies and other waterways are controlled by series of dams which reduce the velocity of flow, impound soil washed from the hillsides, and establish a foundation on which to

build eroded slopes into useable, tillable ground.

The commonest type is the earth dam, which cannot be safely built of virgin clay. Soil which has been washed to remove colloidal material is selected, with preference for that which contains a fair amount of coarse sand. By this means there is a good chance of avoiding the formation of cracks in the dry season and hence of the intrusion of water when rains occur. The upstream and downstream slopes of the dam have grades depending on the nature of the material used and its natural angle of repose. The downstream bank is sodded.

In the great majority of cases there is a central spillway of the drop-inlet or basin type or in the form of a flume on a gentle grade. The first two types are generally built of concrete, sometimes reinforced. The basin type has the advantage that the water coming over the dam falls into a cushion of water, but it cannot be easily increased in height.

The inclined-flume type of spillway is simple and inexpensive. The flume is lined with willow and tamarisk twigs, gravel covered with wire netting and coated with cement mortar, or a 4-inch layer of concrete. Its base is the same earth of which the dam is built. If the dam is raised the flume can be extended to the new level without appreciable change in grade. This type of spillway, like the drop inlet, can be readily raised when necessary to enlarge the catchment basin.

Lateral spillways are sometimes used for moderate discharges where the natural formation at the ends of the dam is solid and other conditions are favorable. A spillway is built at either end of the dam, one of them at a higher level for emergency flows. An unusual method, requiring great finesse, is to build the sodded dam perfectly level and allow the water to spill over its full length.

The standard practice is to start dam construction in the lower reaches of the main waterways, preferably at the junction of two or more tributaries, to insure quick filling of the catchment basins. Progress is upward, ramifying the system to include minor tributaries. Frequently the drainage basin is divided into sectors, each of which is treated as a unit for planning and operations.

As developed in Italy, the shaping of ragged clay slopes is so unique that a fairly detailed description will not be amiss.

The objective of this work is to fill the silt

basins, to lower the ridge crests, and to achieve slopes that are stable, tillable, and well-rounded, so that contour cultivation will be possible without introducing fantastic curves. The process is not only a prelude to cultivation but continues long after cultivation is started. It is generally planned with the idea that the slopes must be brought to grades of 20 to 27 percent, depending on the composition of the soil. In addition to the remodeling work itself, there is the provision of dams in the waterways to collect the material washed down from above, followed by the successive raising of the dams to accommodate all the material and aid the process of bringing adjacent slopes to uniform grades. Then, there is the work of the farm laborer who, starting wherever the slope has been sufficiently modified to prevent landslides, works steadily upward to aid reclamation operations. His labors are particularly useful because constant tilling improves the soil.

The remodeling job is started by building ditches down the crests of the ridges, beginning at the top of the eroded amphitheater, inducing erosion to round off the crests and contribute material to the catch basins below. As the ditches deepen, their walls are broken down by hand. Where this method is not practicable, ridges and declivities are demolished by the use of explosives. First, small charges are used to create chambers in which heavy charges can be placed. The best results are achieved if the "mining" starts at the bottom and works upward. The actual tilling of the mined soil generally starts in the third year. Naturally, the water and mining methods are often used in combination.

Essentially the slopes are shaped by three kinds of ditches: Eroding—already described; transporting, i. e., collecting and carrying the water from one part of the slope to another; and regulating, i. e., draining off surplus water and depositing material carried in suspension.

The use of ditches may be divided into two phases, of which the first occurs when the slopes are still very steep, 60 percent or over, and the water must be conducted, not straight down but at grades steep enough to insure the desired amount of erosion and to avoid penetration that might result in landslides. These ditches are usually small and placed close together wherever possible in order to limit the discharge. Ultimately, the system assumes the form of a fish bone, with the spine, or main ditch, on a ridge and leading into

it on the slopes the laterals, with grades of 20 percent to 40 percent, depending on the general slope of the terrain. This phase may cover several years, during each of which the location of the laterals is changed.

The second phase starts when the slopes have reached the desired configuration. Then two series of ditches are introduced, the secondary running more or less at right angles to the main ones and dividing the slopes into four-sided figures containing something like one-fortieth acre each. By this time the catchment basins in the lower waterways have reached the final stage with a canal running from one spillway to the next, dividing each basin into two small fields and draining off the water from the hillside ditches.

PLANNING

As may be seen, the control of erosion in clay lands and putting the lands into productive use is a highly complex task that covers a period of years. As each minor drainage basin is attacked, a control plan is made, but it is impossible to blueprint all the necessary operations in the beginning. The plan must be constantly revised to cope with the unpredictable whims of Nature. Both the initial planning and the subsequent steps require highly competent engineers and agronomists who are prepared to devote substantial parts of their lives to single projects. Success depends, too, on ability to gather together a competent labor force for the engineering work and on the training of a resident group of farmers for the essential task of proper tillage.

PUTTING THE LAND TO WORK

As we have seen, the cultivation of the soil proceeds during the control operations. It is not possible, however, to reach a state of anything like perfection until some time after the first step is taken. That step is to make the raw soil of the remodeling hillsides capable of producing the crops essential to the local economy and the needs of the people. Working and reworking the soil, washing it with ditch water, exposing it to all the weathering agents—water, air, frost, great heat, and drying winds—are necessary and beneficial. Deep plowing of virgin clay lands, in order to hasten the weathering process, assist the plants to contribute organic material, and facilitate the use of fertilizers, is a “must” of Italian agriculture.

By these means the permeability of the soil to air and water, as well as its water-holding capacity, is increased.

Among the plants best adapted in the early stages are certain legumes, especially *sulla* (*Hedysarium Coronarium* L.) and grasses belonging to the genera *Agrostis*, *Bromus*, *Festuca*, and *Agropyron*, which are able to establish themselves more or less spontaneously. They not only contribute organic matter to the soil but also provide feed for the cattle which are the only usable and available draft power for cultivation. Incidentally, the meat provided by the cattle helps to tide over the lean years of scanty crops.

In the first stage it is necessary to use plants which protect the surface and enrich the soil. Nevertheless, it has been found that failure to plow annually, or at least every 2 years, increases the danger of landslides. *Sulla* and alfalfa, the first because it so easily adapts itself, and the second because of its greater productivity and superior root system, are the legumes that are most favored for early planting.

In the earlier years the farming operations recommended show a strong tendency toward concentrating about equally on leguminous forage crops and cereals with a minimum of the *rinnuovi* which at first consist of horse beans and vetch, replaced in later years by crops like tobacco, sugar beets, hemp, and tomatoes. These are often important sources of income but tend to require both deep plowing and heavy use of manure and artificial fertilizers. The use of these crops is limited to soils which, following reclamation operations, contain a sufficient mixture of sand.

But above all, the successful conquest of the clay hills depends on the human element, on the peasant recruited from the immediate neighborhood, who, in best Italian tradition, is prepared to put all his efforts into nursing the land back to a healthy condition, with a sort of passionate devotion born of love for the soil and the things it can grow. In much of Italy the prevailing system is that of the *mezzadria* in which the large properties are divided into *tenant holdings* of less than 25 to more than 65 acres, and the tenant receives half or more of the crop in return for his labor, and half of current production expenses. While this is not an ideal system it frequently results in a sort of partnership between owner and tenant families which endures through generations. Each *podere*, or tenant holding, is usually occu-

pied by a family group consisting of several brothers and their families, who live with their parents in a house provided by the landowner. As an agent of *sistemazione*, the *mezzadro* has the basic knowledge necessary and a strong incentive under a fair-minded owner, with the benefit of technical advice, to make the land produce. He has the satisfaction of carrying it through the forage, cereal, and *rinnuovo stages* to the point where a substantial part of the farm, if not too clayey, is ready to produce vines and olives or fruit trees. Newly recruited families are small—4 to 5 persons—so that they can make a living while the work proceeds. Old established families may run to 25 members.

In every *bonifica*, as new farms are developed on the eroded hillsides and in the little valleys, it is necessary to build new houses and farm buildings for the tenants. While these houses do not contain all the modern conveniences, they are built according to plan and are as sanitary, commodious, and comfortable as possible under the circumstances. Provision is made for housing farm animals, farm implements, and for storage of produce. Other requirements of each project are schools and health services, water supply, and roads.

In the sticky clay country, roads are a prime necessity. With farm houses isolated for months at a time during the rainy season, sudden cases of illness might easily result in death before a doctor could reach the patient. One of the first moves, therefore, is to start construction of a system of ballasted, graveled roads on easy grades and good alinement, with a road to every farm connecting with the principal arteries. The road system conforms to the *bonifica* plan; canals are bridged, certain dams are built wide and strong to accommodate traffic, the reclamation work itself is hastened and facilitated. The system grows as the work proceeds. Children have easy access to school, farm produce to market, and supplies to the farm. Seas of mud are no longer a threat to progress and human well-being.

The clay lands are invariably short of permanent sources of water. The provision of water for people presents a problem that must be, and is, solved in various ways. Small dirt reservoirs are built for livestock which, under constant use, provide water until August at the latest. To avoid the necessity of hauling water long distances, rain-

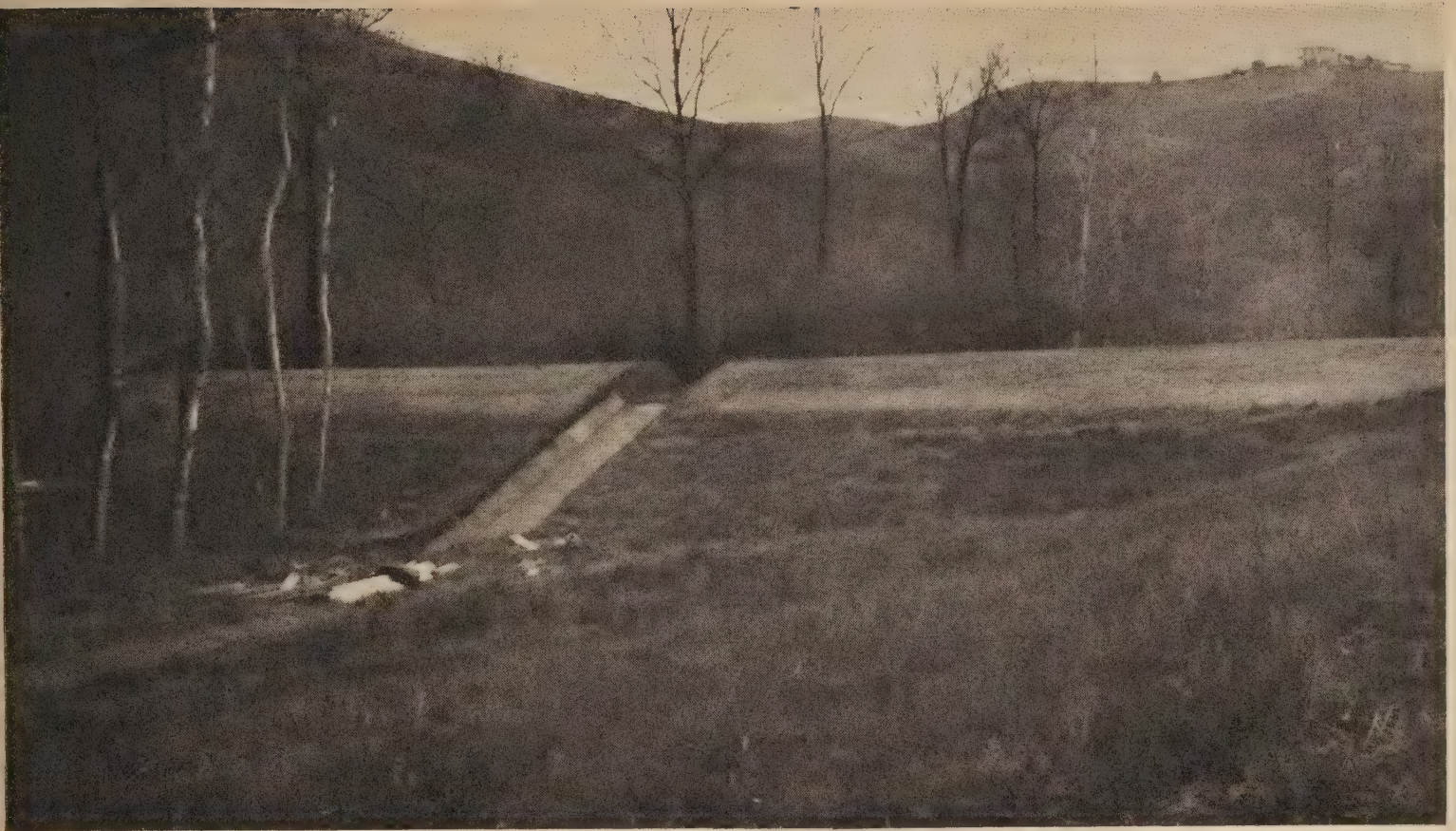
water cisterns are built, or if practicable, water is piped from the nearest permanent sources of supply. In short, subject only to the technical and financial resources of each *bonifica*, all the necessities of daily living are provided. Under the best conditions, life in these hills is often more healthy than in the broad valleys and plains.¹

COSTS AND BENEFITS

An attempt to assess the dollar cost of reclaiming clay lands and putting them to work is likely to produce an accusation that the assessor has pulled figures out of the air. In the first place there is such a wide variation in degree of "degradation" between one area and another that representative figures are well-nigh impossible. Second, the initial outlay by the *Consorzio* and the government are only part of the story; the other part is the never-ending labor of the farmer and the constant public improvements that are contributed throughout the life of the project. Third, the only figures available are prewar, bearing no logical relationship to the present monetary ratio between the lira and the dollar, or to the present costs of materials. Suffice it to say that prewar costs seem entirely in line with benefits to the land proprietors, tenants, and the Nation, and that, anyway, the work must go on if Italy is to survive. To abandon or even slow up work on the clay lands would mean not only a constantly diminishing area of tillable soil but an increasing threat to irrigation, drainage, health, and water-power development.

Within any approved project, or *bonifica*, existing law provides that the national government may contribute the full cost of hydraulic systemization (dams, ditches, canals, etc.) and of reforestation; 75 percent of the cost of roads intended for public use (30 percent for farm roads) and 25 percent of other costs, including houses, land improvement, sanitary and water services. The *Consorzio*, composed of landowners, acting in cooperation with the government, is, to all intents and purposes, a public agency which must plan and execute the work, provide instruction and technical assistance to farmers, handle the finances and, in short, assume full responsibility to the State and the public for the success of the undertaking.

¹ Population of reclaimed clay lands ranges from 130 per square mile in Tuscany to 360 in Marche.



Earth dam with flume outlet lined with prefabricated concrete pieces used in the Val d'Era Zone. A recent elevating of the crest may be noticed. (Photo by Val d'Era Reclamation Consortium.)

The benefits of the work are many and varied. Sometimes completely unproductive land is brought into use. More often it is a matter of better and more profitable use. Poor grazing lands for sheep are transformed into good pastures for work, milk, and meat animals, with greatly increased animal-carrying capacity. More land is provided for grain and other food crops, with an assurance of constantly better production through better cultivation and rotation systems. Large farms are divided into a number of small ones, with better working conditions and improved opportunities for a living. In typical cases, returns to the landowner have increased from 100 to 300 percent.

From the standpoint of the worker the opportunities for improvement are many. He has the benefit of technical help and instruction; his work becomes easier, more varied, and better distributed throughout the seasons. He acquires more work and draft animals and has more contacts with the social life of neighboring towns and villages. It becomes possible to provide outlets for members of family groups that have grown excessively large; some of the sons become tenants and heads of families in their own right instead of farm laborers. There are new chances for migration from

overpopulated zones to newly developed lands. The people live in better houses, have decent water to drink, access to medical services, and the pleasure of expanding their meager diet to include more meat and poultry, wine, olive oil, and vegetables. Such benefits cannot be measured in cold cash.

As for the general benefits, it is even harder to achieve concrete expression. It is highly significant, however, that the laws of the Nation permit a heavy public contribution to the work of amelioration and that national planning, insofar as it has developed since the war, tends strongly in the direction of reclamation and repair of damaged resources. Italy's economists and agricultural scientists have been quick to grasp the situation.

THE FUTURE

The clay lands of Italy, making up over one-fifth of her total land area, are by no means her only land problem. Throughout the country, and especially in the hills and mountains, there are many and diverse needs of better land and water use. The clay lands, however, present the most dramatic and spectacular examples of deterioration, proceeding at a more rapid rate than in any of the other formations.

To say that only a small beginning has been made in attacking this great problem is no exaggeration. The problem exists in all parts of the country, but in only a few regions has the corrective work been adequately organized. The work which has been done, however, has two great values: It has furnished a long-term proving ground on which to test methods of control and demonstrate measures of proved value. The projects themselves furnish an important basis of education to farmers in the surrounding territory. They also provide an excellent opportunity for a much-needed extension of research activities designed to lay the groundwork for improvement and refinement of the methods now in use.

Italy, like all of Europe at this moment, is deeply concerned with the necessity of increasing its food supplies and doing everything possible to provide a more secure and satisfying life for its people. Whatever her financial resources may be, the Nation cannot afford to delay the start of an action program that will assign high rank to the better use and conservation of its soil and water resources. She has the scientific know-how, backed by over a century of experience. Every dollar spent will be an investment which may be expected to bring both immediate and long-enduring returns.

ONE DAY—OR FIVE YEARS?

By AUSTIN L. PATRICK

MANY FARMERS who attend face-lifting events are overwhelmed by the vast amount of heavy equipment and the large number of workers used in establishing a complete farm conservation plan in 1 day. They are likely to conclude that a complete plan “costs too much,” “is too rich for our blood,” or “our pocketbooks won’t stand the strain.”

This isn’t so at all, says the Maryland Chapter, Friends of the Land, in its current report reviewing the 1-day miracle sponsored by the Frederick County Pomona Grange and witnessed by at least

NOTE.—The author is regional conservator, Soil Conservation Service, Upper Darby, Pa.

40,000 farmers and others at the 175-acre Nellie Thrasher farm near Frederick, Md.

A detailed analysis of the equipment and labor used there, and the cost and time involved, shows that installation of the same complete farm plan over a 5-year period—the average course for such a job on an average farm—under normal conditions would cost a farmer only \$3,940.55 in cash outlay, if he provided the labor and machinery to do all except the work requiring heavy equipment.

Over 5 years, the outlay averages \$781.11 annually. But it is emphasized, this \$3,940.55 includes a cash expenditure of \$2,145.55 for lime, fertilizer, and seed—a “normal expense for anyone doing a good job of farming.” This means that the actual extra cash outlay in establishing a complete farm conservation plan just like the Thrasher plan is only \$1,795, or \$359 per year on a 5-year basis.

The total \$3,940.55 cash outlay in 5 years, is composed of the following general items:

Heavy-equipment work-----	\$1,305.00
(This covers the work that a farmer ordinarily would not do with his farm equipment and labor, such as building the pond and 3,700 feet of diversions, filling the barn lot, grading the farm road, burying stone in fence rows and building outlets.)	
Dynamiting ditch-----	50.00
Fencing material, 650 rods-----	440.00
Lime, 43 tons ground and 18 tons ground burnt-----	493.75
Fertilizer, 23 tons 3-12-6 and 2½ tons superphosphate-----	950.12
Seed, 1,364 pounds-----	701.68
(Orchard grass, alsike clover, timothy, domestic ryegrass, Ladino, white Dutch clover, bluegrass, alfalfa.)	

In the provision for the farmer to furnish the labor and farm machinery to do all except the heavy-equipment work, as noted in the preceding distribution of costs, establishment of the complete plan over a 3- to 5-year period, the report says, “would not interfere with normal farm operations. No additional labor would need to be hired and the only cash outlay required would be for field and other normal expenses in connection with farm machinery. Labor would be used on conservation work when other farm work did not demand undivided attention.”

On a cash basis, the work which the farmer would do with his farm labor and farm machinery would represent \$1,014.50, broken down as follows:

Labor (686 hours at 75 cents per hour)-----	\$514. 50
(This covers such work as fence removal; loading stones, lime and fertilizer; seeding grass and legumes; fence construction and miscellaneous jobs.)	
Farm machinery (200 hours)-----	500. 00
(Cost per hour of tractor and equipment and operators, \$2.50. The work done would be equivalent to what was done at the Thrasher farm by 43 farm tractors, 5 two-B plows, 7 bush and bog harrows, 8 post-hole diggers, 10 lime spreaders, 4 disk harrows, 3 spring-tooth harrows, 5 disc drills, 5 grain drills, 2 cultipackers, 11 cyclone seeders, 2 wheatland plows, and 1 each of the following pieces of equipment: tractor disc, three-B plow, field cultivator, crawler tractor, large cultipacker, rotary terracer, weeder, disc tiller, and orchard cultivator.)	

The complete farm conservation plan covered by the 1-day activities at the Thrasher farm included 72 acres contour-stripped; 3,700 feet of diversions; 59 acres of new rotational pasture, seeded, limed, and fertilized; 20 acres of pasture treated; 363 rods of old fence removed, 650 rods of new contoured fence built; and an acre (1.5 million gallons) farm pond for which 2,500 cubic yards of earth were excavated. Gullies were sloped and seeded and waterways were installed. Multiflora rose was planted as a living fence and woodland and wildlife management programs were started. In the operation, 61 tons of lime, 25½ tons of fertilizer, and 1,364 pounds of seed were used.

If the installation of the whole farm conservation plan were to be spread over a 5-year period, the report suggests that the annual cash outlay could be controlled this way:

First year-----	\$866. 00
Second year-----	849. 55
Third year-----	945. 00
Fourth year-----	727. 00
Fifth year-----	553. 00
Total-----	3, 940. 55

On this same 5-year installation plan, the work done annually could be distributed like this:

First year: Establish contoured strips on third of cropland, plant to corn and seed wheat and grass in fall and clover the next spring; remove stone walls; build contoured fence; seed combined fields with hay-pasture mixture; seed hay-type pasture; construct sod waterways in three fields; start selective cut-

ting for fuel wood and building lumber; and blast ditch.

Second year: Build diversion in one field; install contoured furrows, prepare seedbed, and lime, fertilize, and seed one field with hay-pasture mixture; plow and plant to corn about one-third more of contoured strips, seeded to wheat in fall; complete seeding hay-type pasture in one field; build fence between two fields, and continue selective cutting in woods.

Third year: Plow balance of three contoured strips, plant to corn and seed as in previous years; build diversions and sod waterways; remove old and build new fence; prepare, lime, fertilize, and seed field to hay-pasture mixture; continue selective cutting in woods, completing about half of proper cutting in one field, and plant half of multiflora rose hedge fence between two fields.

Fourth year: Build farm pond; lime and fertilize pasture; build fence between three fields; continue work in woods; plant balance of multiflora rose between three fields, and plant Reed canary grass.

Fifth year: Lime and fertilize field; complete selective cutting in woods; plant multiflora rose along streambank; fill in barn lot; complete farm road grading and build fence around barn lot.

Incidentally, the total cash expenditure by the organization that staged the Thrasher farm face lifting was \$17,179.47. This covers more than the cash expenditures in installing the complete farm conservation plan in 1 day, because it includes the expenditures for modernization work done in and around the farm home (\$648.41) and the building of the new dairy barn and milk house (\$6,417.26). It includes administrative and promotional costs of more than \$4,600, but does not include the value of materials, services, and labor donated.

This \$17,179.47 was contributed by city and county industrial and commercial organizations, city and county banks, county government, Mrs. Thrasher (\$1,000), lumber dealers and processors, Izaak Walton League, American Plant Food Council, a farm organization, the State Soil Conservation Committee, and the Maryland Chapter, Friends of the Land, which alone contributed \$8,097.20, almost half of the total.

Is such an expenditure worth while in advancing soil conservation, and can it be justified by the results? These are questions that people sometimes ask. John Ball, farm editor of the *Washington* (D. C.) *Post*, who has followed the Thrasher demonstration closely, gives one answer in a recent news story. Commenting on a visit made to the farm 8 months afterward, he wrote:

"The Thrasher farm has become a sight-seeing attraction rivalling two other Frederick County spots . . . the old home of Francis Scott Key and the Barbara Fritchie house. Visitors to this masterpiece of soil conservation have become a daily affair, averaging 40 to 50 a day, with more on Saturdays and Sundays. Many tours have been arranged, especially from neighboring counties, with 4-H Clubs, Future Farmers of America, veterans groups and schools in charge. Some groups don't even bother to make advance arrangements.

"The road to the Thrasher farm shows the influence of the face lifting. Virtually every farm along it shows some conservation activity. Carl Ingling, SCS district conservationist, who had much to do with the face lifting, and his crew are busy at other farms. The Thrasher farm looks entirely different. There are a few bare spots—where vegetation is finding trouble growing because of shaving too close to topsoil—but generally the site is attractive. The mountainside, where a year ago dust was raised by every eddy of wind, is lush with pasture."

There is another answer in the Maryland Chapter, Friends of the Land report. It says:

"The Thrasher farm is being maintained as a 'conservation masterpiece.' The farm was made over in a single day, but it was not expected that the farmer would change so abruptly. . . . The field day organization recognizes its responsibilities. A committee, including the district conservationist for Soil Conservation Service, the county school agricultural teacher, several successful practical conservation farmers, and the county agent, is working with and advising Mrs. Thrasher in management. A simplified bookkeeping system has been set up to follow the dollars-and-cents progress. A reappraisal of the farm will be made periodically. To what extent the face lifting will materially advance the cause of conservation in Maryland will be determined by what happens on the acreage next year and for some years thereafter."

and in 13 years (1936-49) 60,226 cubic feet was lost.

When these volumes are applied to the surface area of the gully, 30,000 square feet, they represent an average soil-loss rate for the first year of 1.19 inches; for the next 2 years, 1.70 inches; and for the next 10 years, 1.94 inches. The average for the entire 13 years was 1.85 inches per year.

Put another way, the sediment produced by this one gully during the 13 years would completely fill a normal small-stream channel 3 feet deep and 10 feet wide a distance of 2,000 feet. When this volume of sediment is multiplied by the thousands of similar gullies present in this area, the extreme seriousness of the problem can be realized.

The Soil Conservation Service is now carrying out a program of flood-control operations in the Little Tallahatchie River watershed under authorization of the Flood Control Act of 1944. One of the major objectives is control of gully erosion in order to alleviate flood and sediment damages in the bottom lands. Earthen-dam debris basins are being installed in or just below many of the larger gullies to trap sand until kudzu planted in the gullies can stabilize the slopes. Complete stabilization generally takes 5 to 10 years. In terms of designing debris basins, these data show that during the last 10 years about 1 acre-foot of capacity would be needed for every 6 acres of gully area every year which the debris basin was expected to function.

NOTES FROM THE DISTRICTS

DUCKS ON THE PONDS.—A new move to rehabilitate native waterfowl population has been undertaken by the Bureau of Game, New York State Conservation Department, in cooperation with the Allegany County Soil Conservation District. Mallard ducks have been placed on the farms of more than a dozen district cooperators by the bureau. Distribution is restricted to those which are suitable for waterfowl management programs. Ducks also have been placed on ponds at two colleges and on Rod and Gun Club, County Reforestation, and Boy Scout Council ponds. The public has been requested to "leave the ducks alone," so they will nest and raise families.

TALL TALE ABOUT KUDZU.—Rad Bailey, SCS man at Tarboro, N. C., tells about a trip he made in Edgecombe County with an SCS nursery manager:

"We saw some kudzu," Bailey recounts. "It had that old, steep, clay hillside blanketed knee-deep in as tasty grazing as ever a cow wrapped tongue around.

"So far, so good. Then this farmer friend told how one of his calves got his tail cut off, how he put a kudzu poultice on the stub, and how that calf grew a new tail!

"Now I am a great believer in the powers of kudzu. I've seen it heal raw gullies, road cuts, and the like. I've seen it used in canned baby food. Thus, I was prepared to believe the story about the calf and the new tail. What got me wondering, though, was my friend's saying that he put another kudzu poultice on the tail and grew a new calf!"



LIVE-WIRE IDEA.—Since 1943 C. P. Mayhugh, SCS conservation aid in the Shelby County Soil Conservation District, Harlan, Iowa, has been using steel wire, instead of lath, for stakes for laying out terraces, waterways, contour lines, field divisions, diversions and strip cropping. The idea has spread to a number of other work units.

The wire is cut in 2- to 3-foot lengths, depending on where it is to be used. One end is bent into a loop to which is tied colored bunting. The technician simply carries a handful of these wire stakes and jabs them into the ground as he makes the lay-out. The farmer usually can pull them as he plows out the lines.

Mayhugh's unit used salvaged material from the local REA office. That office saves short pieces of brace cable (called messenger wire) which it cannot use. The cable consisted of seven strands of steel galvanized wire of about No. 9 gage. The wire must be stiff enough so that it will not bend readily. The salvaged cable, after being cut into desired lengths, was turned over to the local vocational agriculture instructor. He, in turn, had his shop class unbraid the cable, straighten out the kinks and make loops for holding the bunting.

No. 9 all-steel galvanized wire comparable to the messenger cable wire can be purchased for about 12 cents per pound. It runs an average of 55 feet per pound. With 3 feet per stake, 1 pound of wire will provide 18 stakes, at a cost of two-thirds of a cent per stake. A bundle of 50 laths costs \$1.25, or 2½ cents per lath.

Use of wire makes it unnecessary to carry laths, hatchet, knapsack, and other equipment. The time used in sharpening stakes is eliminated. Physical exertion also is saved, since there is no picking up and laying down of armsful of laths at each station. Lay-out work is speeded

because 50 to 75 stakes can be carried in one hand easier than a lath and a hatchet.

Mayhugh's steel-wire stake idea has resulted in saving a full hour of technical time per day during lay-out seasons. On the basis of 20 percent of technical time spent on application, the saving amounts to approximately 7 man-days per year per work unit.

Wire stakes permit working under conditions where laths are impracticable. Many soil conservation and contour training schools have been held in the Shelby County Soil Conservation District during winter when the ground was frozen. A crack in the ground could always be found for putting in wire stakes. This was not true of laths.

Using different colored bunting on the wire stakes avoids the possibility of confusing one line of stakes with another.



TEXANS HONORED.—Plaques were presented in each of the five soil conservation district State subdivisions in Texas by the Fort Worth Chapter of the Soil Conservation Society of America for unselfish service to soil conservation by persons not farmers.

Dr. R. F. McCasland, of Tulia, Tex.; Hiram Phillips, editor, *Texas Sheep and Goat Raisers Magazine*, San Angelo, Tex.; E. W. Wehman, tractor dealer, Pleasanton, Tex.; O. H. Clark, banker, Marshall, Tex.; and Jim Cantrill, banker, Princeton, Tex., received the awards.

The occasion was the annual "Save the Soil and Save Texas" program organized by the *Fort Worth Press* and other Scripps-Howard papers in Texas.

WANT TO ENTER?—The 1949 National Plow Terrace Contest will be held September 20 on the J. Howard and Gilbert Peterson farm near West Point, Nebr. Entries are desired from all parts of the United States where terraces are built with moldboard plows.

It is the fourth annual contest, the first having been held near Marion, Iowa; the second near Weeping Water, Nebr.; and the third near Harlan, Iowa. Although most of the entries thus far have come from Kansas, Iowa, Nebraska, and South Dakota, contestants have come from as far east as Indiana and as far south as Mississippi.

Winner in 1946 was Norman Hull of Syracuse, Nebr.; and in 1947, Louis Buessing of Baileyville, Kans., won the award. Last year's winner was John Stoburg of Blockton, Iowa.

Sponsors are the World-Herald, the Chamber of Commerce and Farm Equipment Club of Omaha, and the West Point Chamber of Commerce. Cooperating are the Cuming County (Nebr.) Soil Conservation District, the Nebraska State Soil Conservation Committee, the Nebraska Extension Service, and the Soil Conservation Service.

Prospective entrants should communicate with John Lubker, Jr., of West Point, chairman of the general contest committee, or with Jim McDougal, extension conservationist and chairman of the publicity committee, College of Agriculture, Lincoln, Nebr.



MONEY AND MEN.—The 1949 session of the New Mexico State Legislature passed two measures of considerable importance to the State's soil conservation districts.

One bill appropriated \$20,000 out of the general funds to be used by the New Mexico Soil Conservation Committee in purchasing equipment for conservation districts whose credit requires the guaranty of the State committee.

Under the other bill membership of the State conservation committee was increased from 7 to 11. In addition to the 7 members to be appointed by the governor, ex-officio members will include the director of the State Extension Service, director of the State agricultural experiment station, the governor himself, and one member appointed by the United States Secretary of Agriculture.

The first seven appointees will include five soil conservation district supervisors and two members selected at large from among individuals interested in agriculture and soil conservation.

SYSTEM MODERNIZED.—The Cottonwood Ditch Irrigation System, one of the oldest in Arizona and in use in the 1880's, has been completely reconditioned at a cost of \$42,000, as a community enterprise in which several organizations figured.

Officials of the ditch system obtained a water-facilities loan from the Farmers Home Administration, which also furnished engineering assistance. W. G. Glover, SCS engineer assisting the Bridgeport Soil Conservation District, helped in overhauling the ditch system.

The 6½-mile Cottonwood ditch starts on the Verde River above Cottonwood and extends past Bridgeport, furnish-

ing water for 750 acres included in 50 farms. In recent years flumes had worn out, and costly repairs had to be made in the middle of the irrigation season.

Now, wooden flumes have been replaced by concrete structures and inverted siphons of concrete pipe. Through the lower part of the town of Cottonwood, 400 feet of open flume have been replaced with buried concrete pipe to eliminate risk of children being drowned. Manholes have been installed to facilitate pumping of water for fire protection.

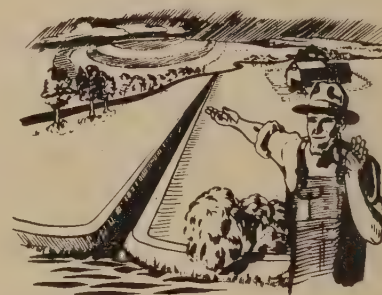
Completion of the project will enable farmers of the fertile Verde Valley to increase crop production by protecting their soil and making more efficient use of irrigation water.

The FHA loan will be repaid in yearly installments over a 30-year period.

SHORT COURSE.—Soil conservation is becoming a regular study in the schools of Washington County, Utah, through the efforts of Milton E. Moody, county superintendent, and N. R. Frei, principal of the Woodward Junior High School at St. George.

In the last 2 years Principal Frei has obtained conservation teaching publications from the Soil Conservation Service and Forest Service for his classes, and also has published several conservation articles in the school paper for use by students.

Recently, Superintendent Moody and Principal Frei announced that they have formulated a course of study for the next school year in which the teaching of conservation will become a regular part of the Social Study Series.



WATERS TAMED.—Latah Soil Conservation District (Idaho) farmers completed nearly 18 miles of carefully planned drainageways last year and plan to develop as much again in 1949.

Setting for the current drainageway program is the high-producing grainlands in the Genesee, Moscow, and Potlatch areas. Here seasonal runoff on upland fields and bottom lands is being routed through man-made watercourses and newly reshaped natural gullies.

Farmers like Nels Lande, Fred Hove, Lee Ernst, and Jess Johnson, all of Genesee, who have enlarged more than 2 miles of Cow Creek to carry off flood waters, know the value of good drainageways.

"Runoff water has to go somewhere and the old creek channel was not large enough to carry it," Lande observes. "Until the Latah District was voted in by local farmers 8 years ago, few of the drainageways in our area were designed along soil conservation lines."



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WELLINGTON BRINK
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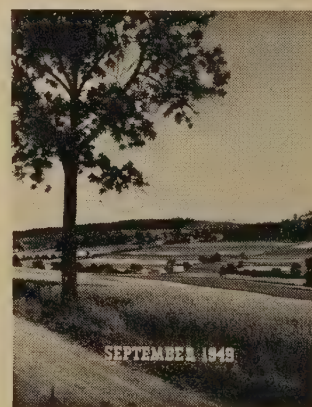
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EQUIPMENT SHARED.—Three Vermont soil conservation districts—Essex, Winookski, and Caledonia—have developed an unusual working agreement covering rotational use of a dragline. The rotation is established in an over-all plan that requires each district to make a \$4 payment for repairs and depreciation into a separate fund for every hour that the equipment is operated. Any unexpended balance, when the dragline leaves one district for another, goes with the equipment. At the end of the life of the machine, or when the agreement is terminated, the balance remaining in the fund will be prorated back to the districts on the basis of the number of hours used by each. It is the first time two or more Vermont districts have cooperated with equipment.

SATISFIED CUSTOMERS.—During 9½ years of work with farmers in Madison, Leake, Rankin, and Scott Soil Conservation Districts of Mississippi, not one has requested that his farm soil conservation plan be cancelled.



FRONT COVER.—This Pennsylvania scene illustrates partnership of town and country. Strips—slightly curved to fit contour, notwithstanding straight appearance—are on the farm of Stanley Lenker. Village in background is Hickory Corners. Hermann Postlethwaite took the photo.

TENANTS

point way



HAVE yet to see a tenant operating a farm on which soil conservation practices have been applied who does not receive considerable benefit," said T. M. Dean, district conservationist, Farmville, Va. Dean recently was talking to Dr. T. C. Buie, who is in charge of the work of the Soil Conservation Service in the Southeastern States, about the way tenant-farmers are helping themselves and their landlords through the use of sound soil conservation measures.

"As a rule," Dean added, "the tenant makes little or no contribution toward applying conservation practices unless the landowner first takes the lead. . . . However, a surprisingly large number of tenants have pitched in and helped. . . ."

Here are some examples scattered throughout the 9-State southeastern region, showing how they have helped.

JESSAMINE COUNTY SOIL CONSERVATION DISTRICT, KENTUCKY

"I have lived on and operated two different farms with soil conservation plans during the past 4 years," says Robert Middleton, tenant on Mrs. Lucille Peel's farm near Nicholasville. "On Mrs. Sally Steel Taylor's farm I observed how diversions built in a gullied pasture (formerly a field) enabled us to get a better stand of grass and increase grazing for our livestock and, of course, more profit for both landlord and tenant. On this farm there were a couple of other fields terraced and I was surprised that farming row crops on the contour with the terraces was not the extra bother that we thought it would be. But I was convinced that it saved soil and rainfall and made us a better yield.

"The reservoirs that the SCS technicians planned have better depth and do not fail. They have been a source of pleasure and of considerable fish for our family. I hope to have a farm of my own some day and one of the first things I'll do is to get help by a conservation survey and a general farm plan with our district."

From the same soil conservation district in Kentucky we hear the following from Mr. S. H. Wheeler, who has been a tenant on the 264-acre Barkley and Burrier farm for 24 years:

"Because I am now on the board of supervisors of this district, I think I have a better chance of observing that tenants are often benefited more than the landlord by these soil conservation plans. As an example, when good reservoirs are built the tenant is no longer burdened by driving stock, changing pasture, or hauling water in case of drought. He also, living right on the farm, enjoys swimming, hunting, and fishing more than the landlord who often does not live on the land.

"I understand the value of terracing and contour farming which is increasing rapidly and the tenants are not objecting as they used to, as they see it increases their yields and saves the soil. But here in the 'central bluegrass' we believe heavy sod is the best possible protection for our soil. So, I am glad that the plans in our district on an average have rotations that plan for fields to lay in sod over twice as long as they did before planning. Our better tenants are coming to realize that when they have an interest in livestock, it pays better to have more good pasture and raise less corn. I would not care to live on a farm without soil conservation."

FLORIDA FARM OWNER SPEAKS OUT

"I feel that my farm has doubled in value since Moore came on the place about 8 years ago," writes Henry Elliott, owner of 240 acres of land near Laurel Hill, Fla. This tribute was paid to W. H. Moore, his tenant, who encouraged Mr. Elliott to draw up a conservation plan with the Yellow River Soil Conservation District in 1942.

While most of this land is too steep for continuous cultivation, cotton and peanuts have long been the main crops grown by tenant farmers. When the soil and water conservation program was planned, several fields were so severely gullied that it was "difficult to drive a wagon across them."

A 35-acre pecan orchard, set out about 50 years ago, had become a liability through misuse and neglect. The farm was so run-down it was neither good to see nor profitable to own.

That was the situation in 1942. Since then, Moore has been retreating from cotton and peanut farming. His ultimate aim now is to establish at least 100 acres of good pasture. Sixty acres have already gone in, planted principally to Pensacola Bahia grass, with crimson clover and fescue in the wet spots. Over 5 miles of terraces have been constructed, with well-stabilized outlets. Blue lupine has been used successfully as a cover in the pecan orchard, which grew 7,500 pounds of good nuts last year. This is not a big yield, but it's a big improvement over the production of a few years ago. Fifty-nine acres of woodland have been protected from grazing and fires have been kept out. A wildlife border of lespedeza bicolor is doing well along this wood lot.

The farm now supports 72 head of beef cattle and as plans mature toward larger pastures and better forage, the Elliott-Moore partnership expects their herd to increase in size. No wonder Elliott made the remark, "As long as Moore is on the place, it is not for sale."

ALABAMA REPORTS

When W. C. Hyde, 52, father of 7 children, moved to the 100-acre farm belonging to H. G. Davis, near Oxford, Ala., he found that corn and cotton had left the land gully-scarred and sheet-washed. The best production of cotton that could be obtained from 40 acres of cropland was about 18 bales. After conservation treatment, he has grown as high as 37 bales of cotton on the same area. Yields of other crops have shown a similar increase.

Before the conservation work was done, the landlord informed his tenant that he would not bear any of the expense in applying the conservation measures. Thus, Hyde proceeded on his own. He constructed 10,100 feet of terraces with his own farm equipment. In addition, he constructed a 1,500-foot drainage ditch to improve an area that was too wet for cultivated crops. And to improve his cropping system, he plants about half of his cultivated land to Kobe lespedeza and vetch each year.

Perhaps thousands of tenants have shown as much interest and enthusiasm in improving their

farming methods as this one, but the story doesn't end on the 100-acre unit of rented land. The landlord owns approximately 900 adjoining acres that are also tenant-farmed. Since his tenant led the way, the owner has constructed 80,000 feet of terraces and brought vetch and Kobe lespedeza into the cropping system on the rest of his 1,000-acre tract. Corn yields have risen from 20 to 63 bushels per acre and Davis concludes, "A man can always learn; my tenant taught me that soil conservation pays."

—GLENN K. RULE.

TEAMWORK IN JERSEY WOOD LOTS

By GLENN E. SMITH

APPROXIMATELY 40 percent of the saw timber cut in New Jersey in 1948 had been marked for cutting by foresters. No other State has such a record or such a complete service for forest owners. There is no secret formula, no magic to account for this success. The reason is simple—cooperation: cooperation between public agencies, State and Federal, in working out a program for the common good.

The New Jersey program started in 1938 when the Bureau of Forest Management in the New Jersey Department of Conservation and Economic Development began organizing a practical system for woods management. Based on sound economics and the use of established forest industries, it has become a complete forestry service for the wood-lot owner who has saw timber to sell. Simply stated, the forester prescribes the silvicultural treatment for any particular woodland by marking the timber to be harvested. Then a private timber agent acts for the owner in carrying out the practices through commercial loggers and getting the largest financial return for the owner.

A few years after this system started, representatives of the Department of Conservation, the Soil Conservation Service, the Forest Service, and the Extension Service of the Department of Agriculture discussed a pooling of efforts in support of the program.

NOTE.—The author is forestry specialist, Soil Conservation Service, Woodbury, N. J.



Farmer and forester Henry J. Scherer, Port Murray, N. J., estimating salable timber in tree.

It was agreed that the Extension Service would contribute through information and education, and that the Conservation Department and the Soil Conservation Service would accept joint responsibility for the service aspects of the program. All forestry requests coming to the county agents and extension forester would be forwarded to the Department of Conservation. In turn, the Department agreed to send these requests to the soil conservation districts when they originated in areas where assistance of Soil Conservation Service foresters is available. Requests originating outside districts were to be handled by the Department and the Norris-Doxey farm forester operating from the State office at Trenton. The Department agreed to help the Soil Conservation Service

technicians at any farm wood lots where additional assistance is needed.

The Conservation Department agreed to take care of all paper work incident to timber sales and to serve as a clearinghouse for all information pertaining to it. Forest technicians in the Soil Conservation Service were to work only with district cooperators. Requests from noncooperators within a district, who did not intend to become cooperators, would be handled by the Department.

This understanding was put into effect promptly. It began to get results immediately and continues to function smoothly and effectively. Each agency is receiving benefits not otherwise available. For example, the two State foresters assigned to the program and the Extension forester promote interest in soil conservation districts whenever they

observe improper use of farm land. The Department forestry research plots and studies are made available to Soil Conservation Service and Extension Service for use at farmers' meetings and for information work. The cooperative management program also has been effective in advancing a common interest in such projects as the annual "show-me" trips to neighboring States for a study of forestry subjects. In the most recent of these expeditions, six different agencies were represented by the nine men who made the trip.

The program harmonized with the normal activities of the cooperating agencies. The Extension Service forester continues to mark trees for cutting in farmers' wood lots and to demonstrate pruning of forest plantations for the benefit of farmers. Practices he uses are those previously agreed upon by all the cooperating agencies. Information and education are principal working tools in Extension Service, but under this program, Soil Conservation Service, the Conservation Department, and Forest Service help in this direction in connection with the common forestry program. It's a smooth arrangement, productive of good results.

The effect of the cooperative spirit has reached far beyond the immediate team. Farmers' requests for forestry assistance are continually being received from Production and Marketing Administration, Veterans' Administration, Federal Land Bank, Farmers Home Administration, and other agencies. Such requests are handled in the same manner as those from the cooperating agencies.

The timber-sale program is not the only enterprise in which the State and Federal agencies cooperate. The Department of Conservation and the Soil Conservation Service have an agreement under which SCS is supplied with tree seedlings for planting worn-out and eroded lands of district cooperators. For wildlife plantings, most shrubs and plants are obtained from SCS nurseries. The Department's Fish and Game Division supplies the soil conservation districts with a large amount of lespedeza and assists in other ways.

As a result of discussions between representatives of the Department, Soil Conservation Service, Forest Service, Extension Service, and the Northeastern Forest Experiment Station, agreements have been reached on planting recommendations for various soil and site conditions. A planting guide, developed for use of all agencies, is the basis on which the sowing schedule at State forest

tree nurseries is planned. All of the agencies cooperate in securing proper treatment of plantations after establishment, and are working out uniform recommendations.

In other phases of forestry, the Conservation Department is cooperating with the Northeastern Forest Experiment Station in a program designed to rehabilitate the pine barrens in southern Jersey. This should be the most productive timber region in the State, but it isn't. Actually in 1948 the timber cut there amounted to one-fourteenth cord per acre. This cut-over, burned-over, grazed-over area of desolation is a monument to American land mismanagement.

The Northeastern Forest Experiment Station had the job of making a study and devising methods of rehabilitation. The Department set aside portions of State forest for these studies and experiments. As a result, a long-term program has been developed and application has been started on State forests in the pine region and on privately owned land. It involves prescribed burning as a forest-management tool in pine-oak stands. It is actively supported by the SCS and Extension Service. Because application calls for a knowledge of fire fighting, the Department's Forest Fire Service gives assistance.

The station also is studying problems in the management of Atlantic white cedar, hardwood swamp types, and hybrid yellow pine seedlings. In whatever programs it develops, cooperation of all of the other agencies is assured.

In a few more years, New Jersey will have an over-all forest land-use program that will be a model for the Nation.

HIGH VOLTAGE PUBLICITY.—A soil conservation advertisement, "Take Off the Topsoil and You Raise the Devil," is being imprinted on all residential post card bills of a large electric power company with offices at Bluefield, W. Va.

This ad goes on a total of approximately 336,000 bills; 188,231 in West Virginia, 133,545 in Virginia, and 13,978 in Tennessee. Included in this group are 26,061 farms in West Virginia, 40,272 in Virginia, and 1,234 in Tennessee.

CONSERVATION CUTS COSTS.—Grider Anderson of Somerset, in Kentucky's Pulaski County Soil Conservation District, knows how conservation can reduce production costs of corn. By careful contouring and land management he now produces 900 bushels of corn on 10 acres where 30 acres were required before.

Here are the champs: From left, front—Herbert C. Milton, 19, Brookneal, Va.; Henry S. Holloway, 15, Darlington, Md.; Wayne Spier, 20, Blue Springs, Nebr.; Boyd M. Cook, 18, New Castle County, Del. Top—Bobby Haynie, 17, Prescott, Ark.; John C. Phillips, 18, Wilkesville, Ohio; John DeMott, 19, Arkansas City, Kans.; David Shoemaker, 18, Colorado Springs, Colo.

By G. I. NOBLE



Project

WHILE Nation-wide 4-H activity in soil conservation is somewhat recent, rapid strides have been made since the early 1930's. The significance of this growth of interest, one astute 4-H'er informs us, was propounded 2,000 years ago by Cato, the Roman philosopher. When Cato was asked what was the most profitable thing a farmer could have, he replied, "A first-class pasture." Asked what would be the next prized possession, he answered, "A second-class pasture."

This, and much more, is taught 4-H'ers taking part in the national 4-H soil conservation program. Contour strip cropping, terracing, building dams, making soil tests, and establishing permanent pastures are some of the many practices recommended. Members are alerted to the fact that the Nation's future depends upon the soil.

So it's not surprising that 4-H Club members take soil conservation work seriously. The project was developed by the Cooperative Extension Service, the Soil Conservation Service, the National Committee on Boys and Girls Club Work, and the Firestone Tire & Rubber Co. The sponsor first provided awards in 1944, and since then participation has more than doubled.

Although individual awards cannot be given to all 4-H boys and girls in the project, what is accomplished is recognized as a vital contribution to the country's welfare. Incentives include a gold-filled medal of honor for county winners, \$50 United States Savings Bond to 6 top-ranking

members in each State, an all-expense educational trip to the annual National 4-H Club Congress in Chicago for 16 of the best among the State winners. Eight \$300 scholarships go to national winners.

In view of growing 4-H interest in soil conservation, the cooperating organizations are now outlining an enlarged club program in soil and water conservation for 1950. Plans contemplate a 4-H leader's manual, leader training, and modifications in the award set-up to recognize younger members as well as teen-agers.

Field crops, livestock, dairying, poultry, and garden depend on soil conditions. That 4-H'ers realize this is apparent in what John DeMott, a national winner from Arkansas City, Kans., has to say. "No nation ever maintained its position in the world if it neglected its agriculture. So we, as farmers, must assume the responsibility of maintaining and improving the fertility of the soil while we maintain a high standard of living. We must leave the soil so that future generations will not be handicapped because of our neglect."

Realizing that a high grain yield and good livestock could not be raised from poor soil, John set about to sell his dad the idea of adopting soil conservation practices for their 640-acre farm. He succeeded. Following Soil Conservation Service recommendations, this foresighted young farmer did most of the plowing of a 10,300-foot

NOTE.—The author is managing director, National Committee on Boys and Girls Club Work, 59 East Van Buren St., Chicago, Ill.

terrace. His dad worked with him, and a grass waterway 5,000 by 75 feet was seeded and 520 red cedars planted for a windbreak. "The one thing that shows up best," declares John, "is our pasture, which I mowed 3 years and kept stock away from last year. It has made a wonderful showing."

Another national scholarship winner, Bobby Haynie of Prescott, Ark., reports, "In the last 4 years all open cultivated land on our 283-acre farm has been seeded to Austrian winter peas or hairy vetch. Turning under winter legumes, together with terracing and crop rotation, increased our average cotton yield from 150 pounds per acre to 300 pounds."

Bobby goes on to say that 2 years ago his dad bought an additional 48 acres in the Little Missouri River bottoms. The land was in the bend of the river and constantly under the threat of being cut across by the water. To prevent this he let the brush grow to protect the river bank. Gullies had begun to appear, so Bobby seeded them to lespedeza.

Since all 4-H'ers "learn by doing," young Haynie found out how to make and operate a level and was then able to assist his school in laying out 44 acres of terraces on the school farm. He supervised setting out 29 acres of trees on the rolling, washed land of the school farm, and predicts that erosion should be checked within the next 4 or 5 years. Bobby estimates the value of his soil conservation practices in the last 2 years alone as close to \$900.

The community 4-H Club of Harrison County, Mo., was proud of James Davis of Bethany, who has worked in soil conservation since 1945. James won a trip to the National 4-H Club Congress last year. "On our 140-acre farm we milk cows, raise sheep, and feed hogs," relates young Davis. Erosion has taken a heavy toll of 50 acres of upland, and has damaged the bottom land by silting in and flooding." Even while attending Missouri's College of Agriculture, James finds time to work out the water management and soil fertility phases of his balanced farm plan. He hopes to complete the livestock phase when he graduates.

James Morgan of Freedom, N. Y., also a soil conservation delegate at last year's Club Congress, tells a typical story. Located in Cattaraugus County, the Morgan farmstead was settled in 1840 by his great-grandfather who crossed the ocean from Wales. The rolling land was cleared and a

log cabin was built on the knoll where James has planted trees. Great-grandfather Morgan soon replaced the crude cabin with a frame dwelling. Here James' grandfather and father were born, and here the family still lives. For 100 years the rain and melting snows had run down these hill-sides carrying away the valuable soil of the large rectangular fields.

James often had been told how the farm, just as it was, had provided a living for several generations. James pointed out, however, that standards of living have changed. "Grandfather didn't have to pay for electric lights, telephone, running water, automobiles, farm machinery, and movies," he declared. "The city lured away many farm boys and girls. But now, thanks to the improved standard of rural life, young people are content to stay on the farm and make it even better. Soil will determine this standard."

Since becoming a 4-H Club member 6 years ago, James has had opportunities to go on dairy and field tours to see what others have done in soil conservation. He comments, "I saw, I listened, and I dared to do something that never before had been done on our farm!" He first set about to improve the pastures. He even worked up a demonstration entitled, "The Importance of Improved Pasture."

For over 50 years James' father had been working rectangular fields. The pasture lane running up the slope back of the barn was as permanent to him as the road in front of the house. Until that lane was changed, James and his brother couldn't go ahead with terraces or contour strips. Finally the day came when the old lane fences were taken down. New ones were built, three diversion terraces dug, and contour strips staked out. Now all crops are planted on the contour.

Summing up, this practical 4-H youth said, "It seems to me that we are on the threshold of a new era, and that soil conservation is one of the keys to unlock the door to that era. I have faith in these practices and know that the topsoil is the most valuable thing on our farm."

In all parts of the country, 4-H members are aware of the importance of soil conservation. From Blue Springs, Nebr., Wayne Spier was chosen a national winner for having 1 of the 8 best records in 44 States. One of the first things he did in his project was to plant a windbreak of 200 red cedar trees on the north side of his home. He plowed and seeded 5 waterways, built a dam,

and planted grass for a permanent pasture. Wayne also made a collection of grasses and weeds native to his community. He reports, "Before I enrolled in 4-H soil conservation I didn't know our farm had one-fourth acre of bindweed. Neither did our landlord. I sprayed this patch with 2,4-D and killed off more than 95 percent."

Wayne's club planted and cared for a grass nursery on the farm of one of the members. The plot aroused a great deal of interest and many people have visited it. The grasses have been used in an educational 4-H booth at the State and Gage County Fairs, winning blue ribbons at both. The club also puts on public demonstrations of waterways and terracing.

A new group of county, State, and national champions is now in the making as 4-H members carry out the 1949 National 4-H Soil Conservation Awards Program. The objectives are: (1) To know the value of soil in their lives and to the Nation, (2) to become interested in the farm family program of soil conservation for present and future production, (3) to learn through 4-H Club work how to conserve soil successfully, and (4) to prevent soil wastage and deterioration on the farms. Club leaders, county extension agents, and district soil conservationists help and guide the youth.

Each 4-H'er participating in the program must meet certain requirements to be eligible for an award. First, he must draw a map of the home farm as is, showing among other things the use of each field for this year and for the two previous years. He also must indicate the amount and kind of fertilizer or limestone applied during the two previous years, determine the average amount of topsoil in each field and the extent of erosion, and show where serious water or wind erosion has occurred.

Second, he must make a map of the farm as it should be to prevent loss of soil or soil fertility. Among the items to be decided are: Where to establish a permanent pasture; where to grow cultivated crops; where to grow trees and exclude livestock; which fields are in need of contour farming, strip cropping, or terracing; whether or not there is too much or too little livestock for effective operation; and whether or not there are any waterways which should be kept in grass.

The third, and perhaps the most important re-

quirement, is the record of practices carried out toward reaching the goal outlined on the map "as the farm should be." Upon the accomplishments, plus his general 4-H record, the contestant is judged for merit awards.

Forty-four States have again accepted the national 4-H soil conservation program. Alaska and Puerto Rico 4-H'ers also take part. Last year, 42,528 members were enrolled and 527 counties named winners.

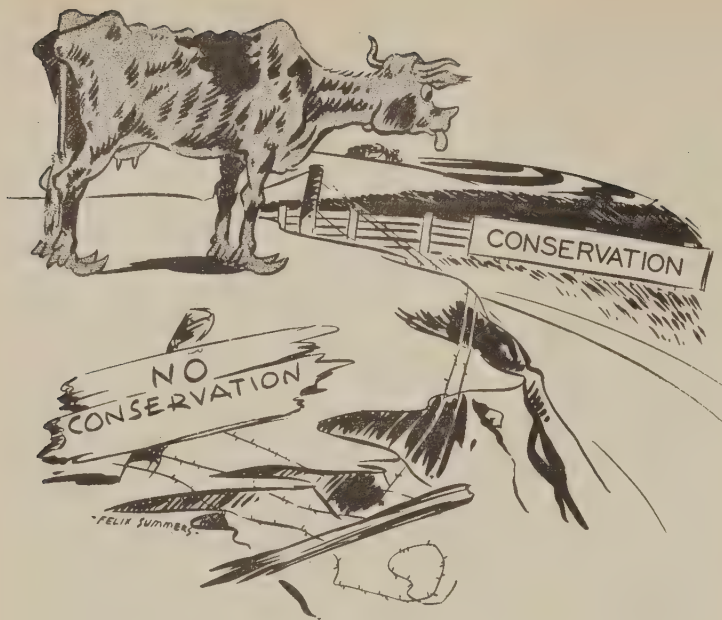


ANOTHER MEDAL FOR CHIEF.—The American Society of Agricultural Engineers awarded the John Deere Gold Medal for 1949 to Hugh Bennett. It goes to a man whose whole life has been of love for and service to the soil.

In the forefront of the medal is the pioneer, striding forth in the dawn of the day and of an epoch, convoying the covered wagon that carried his family, his fortune, and all the essentials of home and farm in a new, wild land—in America—including that irreducible minimum of agriculture, the plow. Walking westward with his rifle on his arm for immediate security, he has the sense of ultimate security, knowing that whatever may be the soil on which he settles, he will be its master because his plow is of the steel and his soul of the temper that will give security to the land and those who live by the land.

Behind him are symbols of the civilization which in a century have sprung from the tracks of his wagon and the furrows of his plow—smokestacks of factories whence come all the creative comforts of a thrifty and successful people. The airplane over this pioneer, now a hundred years after the covered wagon, travels its trail at a hundred times the wagon's pace.

INCENTIVE.—Slope-Hettinger (N. Dak.) Soil Conservation District steps out in State-wide conservation achievement program. Supervisors are giving a year's subscription to SOIL CONSERVATION Magazine to each cooperator from the district who enters this event.



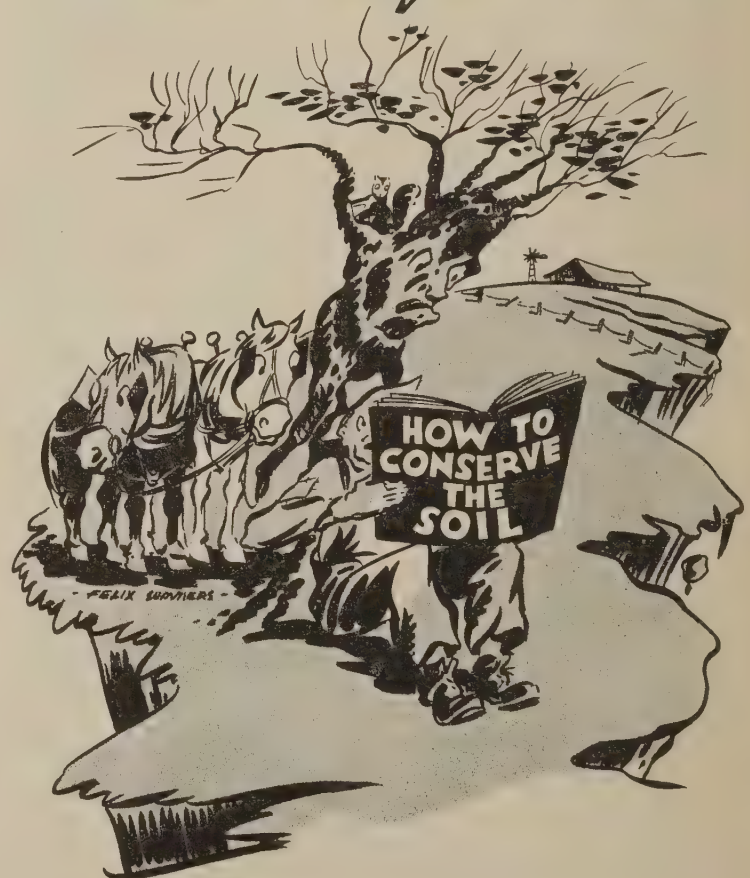
THE GRASS IS GREENER ON THE OTHER SIDE OF THE FENCE!

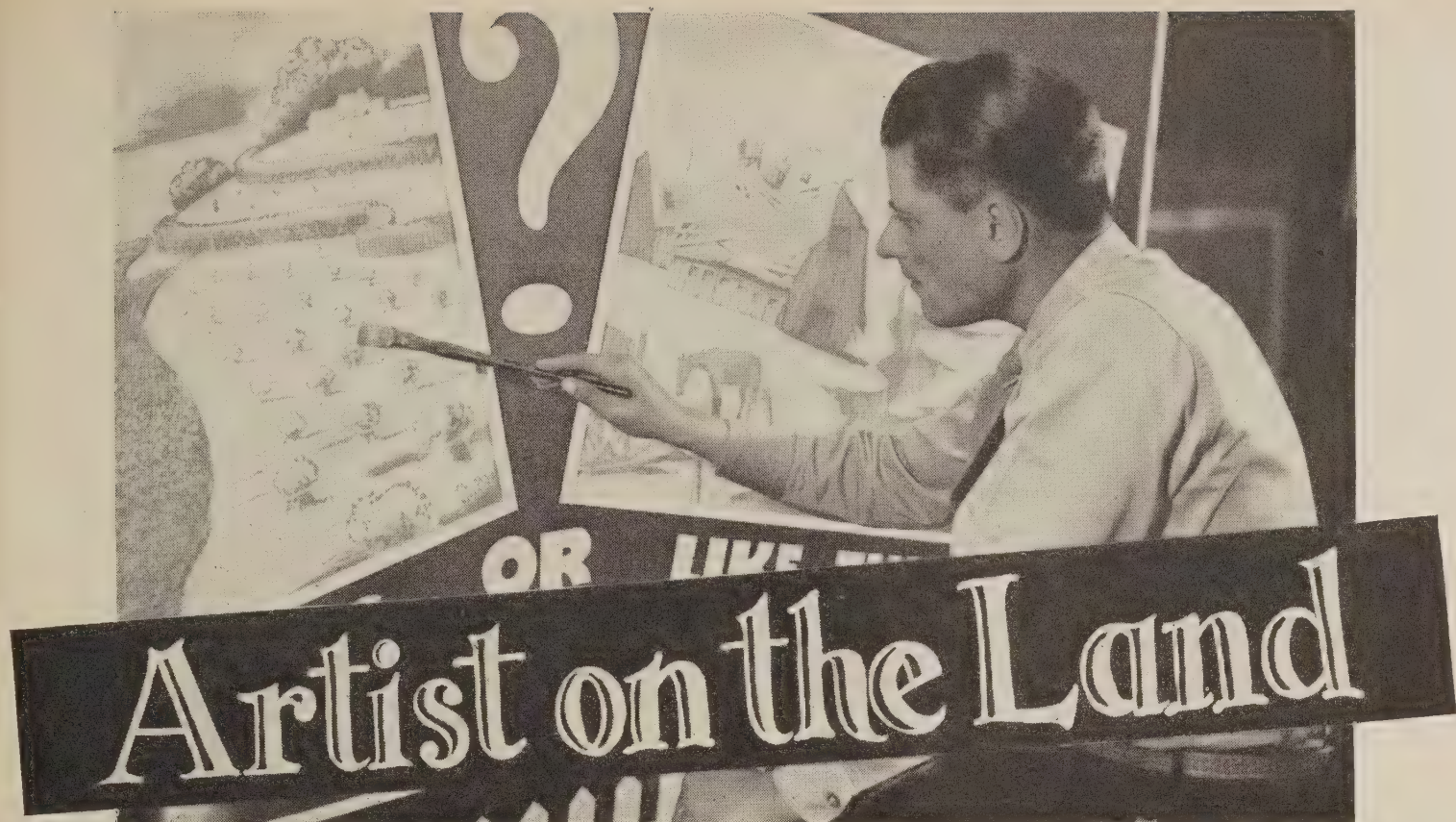


IT WILL RAIN DOLLARS FROM HEAVEN
IF
 YOU HOLD THE MOISTURE



'tis later than you think





By RAY W. JONES

FELIX D. SUMMERS is a husky young man, tanned by the summer sun, who spends his days laying out terraces for farmers of western Iowa. He is a son of old Eli, a pupil of a noted eastern muralist, and a successful artist on Broadway.

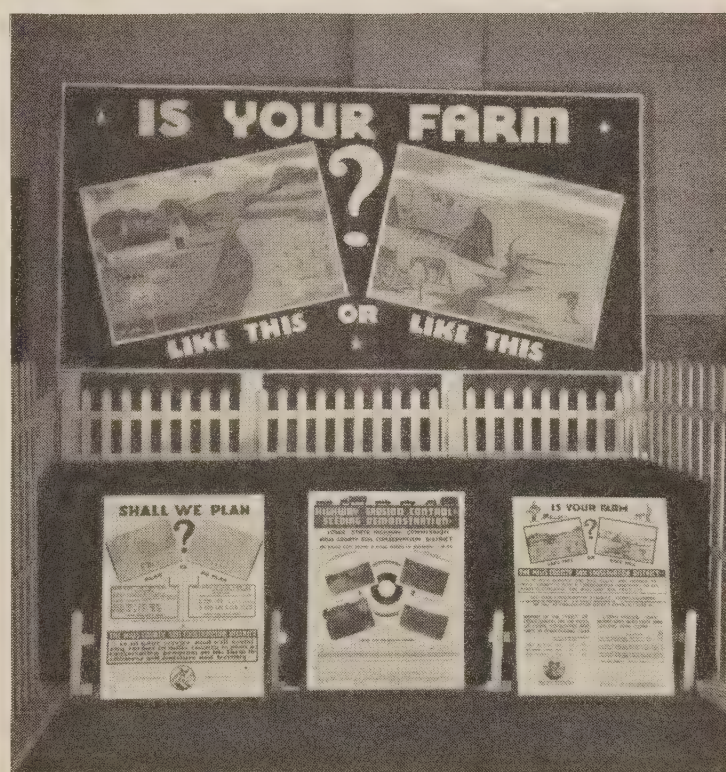
Summers works for SCS in the Mills County Soil Conservation District, Malvern, Iowa. He maps field boundaries, lays out about 75 miles of terraces each year, and does general lay-outs of conservation practices in his job as conservation aid. In spare time, during lunch periods, in the evenings, and on Saturdays, he draws cartoons, posters, and other items useful in soil conservation educational work.

Felix is a descendant of Iowa pioneers. His grandfather, James Newton Summers, came to what is now Mills County in 1854, and settled on a 1,000-acre grant. From that time on the Summers family were prominent in livestock raising and grain farming.

The artist was born and raised on a Mills County farm, and through the years he has made a large collection of drawings depicting rural life. To-

day he admits that his urge to draw goes back to the age of seven.

His parents live in Strahan, Iowa, and it was from the Strahan High School that Felix received his first diploma. After working a few years on an Iowa farm and some time spent as a ranch hand in Wyoming, he decided to continue his education.



NOTE.—The author is work unit conservationist, Soil Conservation Service, Malvern, Iowa.

He spent 2 years at the Peru (Nebr.) State Teachers College, then 3 more at the University of Nebraska getting a fine arts degree. He continued his study and received a fine arts degree from Yale in 1935. Then came a year with Eugene Savage, New York mural painter, followed by 6 years in New York as a mural painter and wall decorator.

His murals have adorned the walls of the El Morocco Club and the Cotton Club. One of his murals may still be seen in the Franklin Simon Department Store on Fifth Avenue.

After serving in the Army with the combat engineers, Summers returned to his home in Mills County to rest, planning to go back to New York to the painting of murals. His interest in agriculture, however, led him to accept a short-term appointment with the Soil Conservation Service for work in the Mills County District. He did a few drawings for the district more or less to keep his hand and eyes in practice.

However, he has remained in the district for 4 years now and in addition to being a high producer in laying out conservation practices, has in odd moments turned out an average of more than one drawing a week. Carrying a small sketch pad in his pocket, he constantly makes notes from everyday life—a dejected-appearing person, perhaps, or a very happy person; a badly eroded field or an unusually well-kept one; a weedy pasture or one well seeded; a set of dilapidated farm buildings or a well-kept group. At other times his attention may be caught by a scrawny horse, a cow, or a mongrel pup. Felix frequently observes, "Poor land makes poor people."

Although Felix Summers has duties only as a conservation aid, he gives his exceptional talents freely to promote an understanding of the land and its problems.

In addition to turning out exceptional posters, progress charts, illustrated reports, maps of planned practices, and other more or less routine drawings, Felix has combined his art with his knowledge of agriculture to produce a large number of cartoons which tell a needed story in few words for the benefit of farmers and city dwellers. They are widely used in the Midwest. Among the more popular have been "Yet We Worry About the Atomic Bomb," "Let Her Blow," "It Will Rain Dollars from Heaven," "'Tis Later Than You Think," and "It Will Take More Than Cussin' to Stop Him."

OUT OF THE ASHES COMES THE GRASS

By THOMAS I. WILSON

FROM ashes to grass in less than a decade is the story of 200 acres of burned-over forest land in eastern Umatilla County, Oreg.

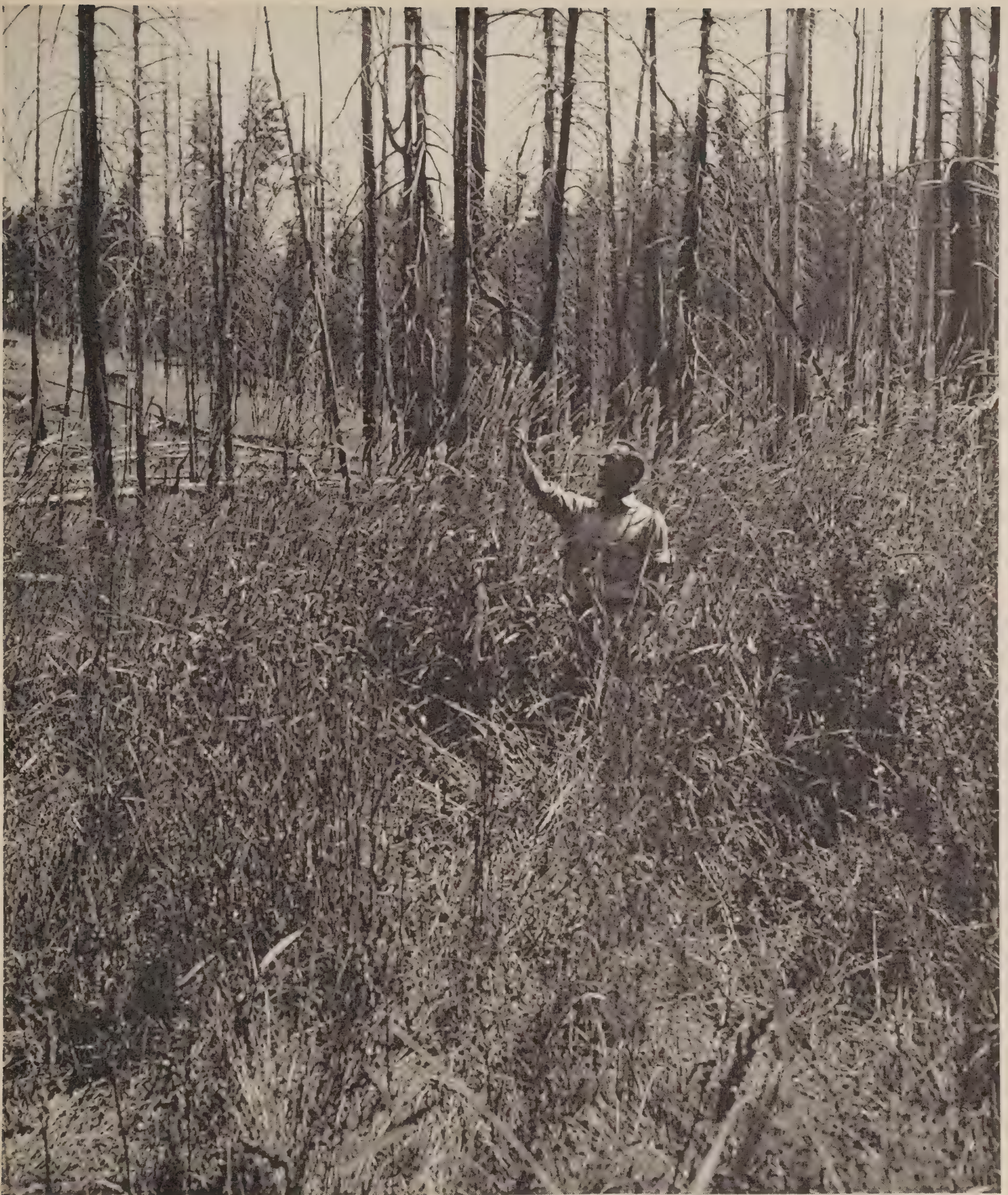
In August 1939 a forest fire leveled some 1,200 acres of yellow ponderosa pine on the Pat Doherty sheep ranch on Butter Creek near Vinson. All that was left was a thick layer of fluffy ashes. With all protective cover gone, erosion found an easy mark. Soil in the area is particularly vulnerable once it loses its cover.

In this part of Oregon the only vegetation appearing the first 2 or 3 years is the annual grasses. These do not afford erosion protection and they do help to continue the fire hazard. With this in mind, J. H. Parkins of SCS suggested to Doherty that 200 acres of the burned-over land be reseeded to several grass mixtures to determine if certain plants could be artificially established on burns; if once established, how long they would remain as an important vegetal cover, and how effective they would be as compared with natural recovery or no recovery in stabilizing soil movement and reducing destructive runoff. Doherty was enthusiastic about the idea and the test was undertaken in 1939 in cooperation with the Oregon Agricultural Experiment Station.

Soils in the area are generally from 18 inches to 3 feet deep. They are mainly of the Underwood, Cause, Waha, and Helmer series, and there is some Craig which may be 5 to 8 feet deep in places. The slopes are generally moderate to steep. Some native grass was left on open hilltops and south slopes where sparse stands of trees and brush did not burn.

The seeding was started December 1939. Previous experiences in similar areas showed this type of seeding should be made late enough in the fall to avoid fall germination because of the danger of spring soil heaving while plants are small. Hand seeders broadcast the seed in the ashes on the fifteenth of the month, with five men walking abreast seeding approximately 100 feet at a strip. End points were marked for guidance on the re-

NOTE.—The author is work unit conservationist, Heppner, Oreg.



This reed canary grass was seeded 9 years ago on burned-over timberland in Heppner Soil Conservation District. It grows well over 6 feet tall on moist sites. That's Tom Wilson of SCS checking results.

turn trip. Comparable unseeded areas were designated throughout the burn for comparison. As the seed had been in storage for several years

and the average germination reduced to approximately 35 percent, sufficient seed was used to give a rate equivalent to 8 pounds of good seed per acre.

It was agreed that no grazing would be allowed the first season unless the stand was well enough established to permit a band of sheep to pass through the area in the fall.

To determine the effectiveness of various grass mixtures, the seeding was carried out in plots as follows:

	<i>Pounds per acre</i>
Plot 1:	
Alfalfa.....	5
Crested wheat.....	10
Tall oat.....	7
Plot 2:	
Sweetclover.....	5
Timothy.....	3
English rye.....	4
Slender wheat.....	10
Orchard.....	.25
Plot 3:	
Hairy vetch.....	7
Smooth brome.....	10
English rye.....	5
Plot 4:	
Crested wheat.....	12
Miscellaneous, including mountain brome, blue bunch wheatgrass, bulbous blue- grass, little bluegrass, and Idaho fescue, each in small quantities.....	10
Plot 5 and 6:	
Crested wheat.....	11
Mountain brome and miscellaneous, includ- ing small quantities each of smooth brome, slender wheat, tall oat and Eng- lish rye.....	5

When an inspection was made July 20, 1940, an excellent stand was evident on each plot, and most species were setting seed. At that time there was very little vegetation in the grass stands other than the species seeded, except for an occasional plant of pinegrass. Since there was no cover on any part of the area during the runoff season of 1939-40, erosion measurements were not made, but soil and water losses were observed throughout the entire burned area.

On the unseeded area varying amounts of pinegrass, fireweed, spirea, bull thistle, and downy brome grass were growing, which in no case afforded so complete a cover as the seeded grasses and legumes. No forest seedlings were found in the area. The seeded grasses stayed green throughout the fire season and were, therefore, more resistant to another fire than the natural vegetation in the unseeded area.

First inspection showed the following species best adaptable for this type of seeding in the order listed: Tall oat, English rye, crested wheat,

smooth brome, orchard grass, alfalfa, timothy, sweetclover, hairy vetch, and mountain brome. Eight pounds of high quality seed per acre was deemed adequate to obtain excellent stands.

An inspection made in November 1941 (the second year) showed that a good stand was obtained by late fall seeding, that the seeded area was protected from measurable erosion the second year after the burn, and that the grasses had a deterring effect upon the establishment of tree species in comparison with the burned, unseeded areas.

After 2 years the unseeded burned areas did not have an erosion-controlling cover, up to 25 percent of the topsoil had been lost in the burn, and the carrying capacity was still zero. Vegetation consisted of some spirea, snowberry, snowbrush, pinegrass, bull thistle, china lettuce, and downy brome grass.

The species predominating in the seeded area and listed in order follow: Tall oatgrass, smooth brome grass, crested wheatgrass, mountain brome grass, bulbous bluegrass, timothy and orchard grass, sweetclover, alfalfa, slender wheat, English rye, and hairy vetch. A very small quantity of reed canary grass, seeded in a rather damp site, made excellent growth.

The tall oatgrass and smooth brome grass appeared to be scattered over most of the entire area, and in favorable spots attained a height of over 6 feet. On the other hand, the English rye and slender wheat, which had made an excellent growth the first year, grew to a height of only 6 to 12 inches. The bulbous bluegrass, not found the first year, was much in evidence on plot 4 and grew to a height of 12 to 14 inches.

Grazing was deferred until July. After a band of 900 sheep was kept on the area for 1 month, it was estimated that about one-fourth the available forage had been used. They were then removed because dry, downy brome grass in the unseeded parts was causing sore eyes in the lambs.

This grazing was equal to 4.5 sheep-months per acre of grazing, with an estimated carrying capacity of 12 sheep-months per acre. That would approximate 20 cents per acre at the Forest Service rental rate for summer range, or approximately 40 cents if rented to private owners at that time. Using this as one-fourth of the total forage available, it would give an annual value of 80 cents at the Forest Service rate, or \$1.60 at the private rate for that time. Therefore, the

annual available forage would pay the cost of seeding (\$2.50 per acre) within 3 years.

After 9 years a follow-up inspection was made in August 1948. The seeded area was still green, and tall oatgrass and smooth brome grass were very much in evidence over all the plots. Tall oatgrass was most evident, growing to a height of 4 to 5 feet on all plots. It appeared to have taken over as stands of other grasses thinned out. Smooth brome grass appeared to have been grazed heaviest in preference to the tall oatgrass. The best stands of crested wheatgrass were found on shallow, rocky soils. Little bluegrass and some bulbous bluegrass were the only understory grasses found; occasional Idaho fescue plants and clumps of mountain brome grass were noticed throughout the area. An occasional plant of alfalfa was found in plot 1, but these plants were low in vigor and had been grazed to ground level. No sweetclover or hairy vetch was found and

they had completely disappeared in the plots in which they were sown.

Since sheep have grazed this area for summer range since its seeding, it was assumed that heavy utilization of the highly palatable legumes was a major factor in their disappearance. It would not have been practical to limit grazing to perpetuate these highly palatable legumes since they furnished a very small percentage of total cover in the area. Snowbrush and pinegrass, appearing in small portions, were the only noticeable native plants growing. There was a scattered reproduction of yellow pine, lodgepole pine, and Douglas fir. There was no measurable erosion.

Thus, after a period of 9 years, results of artificial seeding on this 200 acres of burned-over land have shown that destructive erosion, so frequently the aftermath of fire, can be stopped in its tracks. They also demonstrate a thoroughly practical method for converting a liability into an asset.

TALE of TWO FARMS

By J. M. PARKS

WHEN Elmer Hutcheson bought his 116-acre hill farm near Lockhart in south central Texas in 1919, he paid \$65 per acre. An adjacent farm had just sold for the same price and he was sorry he hadn't been able to buy it, for it was considered somewhat better.

Last fall the other farm sold for \$40 per acre. But Hutcheson at about the same time refused \$100. The difference was soil conservation. Hutcheson's had it, the other did not. The other had a few old terraces. It had lost topsoil and declined in productivity. Hutcheson's place had a conservation program which included all the various measures needed to control erosion and put every acre to its best work.

In 1923 Hutcheson saw erosion doing serious damage to his sloping fields. "I was told that terraces would protect my land and make me rich, and I believed it," he recalls.

So he put in terraces. They were not, however, properly designed. At one end they emptied water into an adjacent field. The water cut into the ground and carved out a tunnel. One day the



Elmer Hutcheson views old gully formed when water from improperly designed terraces cut into ground and gouged out tunnel that finally collapsed.

top of the tunnel fell in. Result: A big gully.

On the other side the terraces emptied into the roadside. With the first hard rain, the county road was washed out. "The county commissioners threatened to sue me," Hutcheson chuckles.

When the Hays-Caldwell-Travis Soil Conservation District was organized in 1940, Hutcheson became one of its first cooperators.

The troublesome terraces were redesigned to empty into a natural draw protected by a thick stand of grass. A 6-acre field at the base of two slopes was taken out of cultivation and made into pasture. The natural draw now spreads excess water safely over that pasture. "I wasn't any too

NOTE.—The author is district conservationist, Soil Conservation Service, Seguin, Tex.

happy about changing that 6-acre field," Hutcheson remembers. "Now it's my best pasture."

With the terraces and other mechanical measures working properly, Hutcheson has turned his attention to the more important vegetative part of his program. "I've been long on terraces and short on soil improvement," is the way he puts it. "It's only in the last 2 years that I have been giving proper attention to soil-improving crops. I believe I'll be able to double the yields I was getting when I began my conservation program."

In 1948 Hutcheson harvested one-third more cotton on land that had been improved with Hubam clover than on adjacent land where no soil-improving crop had been planted.

Other major practices are crop rotations and the adjustment of stocking rates to fit the forage available. Eighty-two acres are in cultivation, the rest in pastures. In cultivated fields Hutcheson raises cotton, maize, corn, Sudan grass, and clovers. He usually keeps about 80 sheep, 300 to 400 chickens, and 4 or 5 milk cows.

Five years ago he was elected to the Hays-Caldwell-Travis Soil Conservation District board of supervisors. He is now vice chairman.

REVIEWS

GARDEN SOILS: THEIR USE AND CONSERVATION.
By Arthur B. Beaumont. Orange Judd Publishing Company, Inc., New York. 1948. \$3.50

This attractive volume fills a long-felt need for a book on garden soils and their treatment, including conservation. It bridges the gap between the many excellent books on soil science and those on the culture of vegetables.

In the beginning the author gives a popular description of soils, their characteristics and adaptations. This includes briefly the formation of soil, what constitutes soil, the different kinds and groups of soil, where they are found, and the uses to which they lend themselves. Such terms as mineral soils, organic soils, loam, soil series, and soil types are described so that the lay person can understand them. Garden soils and sites are discussed in detail. Criteria for garden soils and their adaptation are taken up under texture, structure, profile, drainage, chemical composition, organic matter, stoniness, and topography.

Succeeding chapters treat soil fertility and the improvement of garden soils through the use of fertilizers, organic matter, and proper tillage. Conservation of

garden soils and the use of conservation practices run throughout the discussion. Compost, mulching, winter cover crops, and other conservation practices receive special treatment. One entire chapter is devoted to compost for home gardens. It treats the making, use, and application of compost, also the addition of inorganic fertility amendments and reagents to hasten decomposition, as well as the micro-organisms which bring about decomposition. While the use of compost and other organic fertilizers is recommended, their use to the exclusion of chemical fertilizers is held to be a mistake.

The purchase and planting of earthworms is frowned upon. It is contended that if the soil has sufficient organic matter, the earthworm population will take care of itself.

Up-to-date information on weed killers, hormones, and other plant-growth regulators is supplied. The last paragraph of each chapter summarizes the things to be remembered. Such special features increase the value of the book to both amateur and experienced gardener.

The book concludes with a chapter on soil, vegetables, and health. It treats of the prevalence and increase of degenerative diseases due to lack of important minerals and vitamins in the food we eat. Vegetables and other plants contain only the minerals which are found in the soil on which they are grown. Vegetables of similar appearance may vary widely in chemical composition and nutritive value. The way to supplement a poor soil with needed minerals and balance fertility is to add the minerals through commercial fertilizers. The author rejects the idea that chemical fertilizers are harmful to animal and human health.

—W. W. REITZ.

FLORIDA WILD FLOWERS. By Mary Francis Baker. Macmillan Co. New York. 1938. Price \$3.50.

A quick method of identifying common plants is desired by many field men. Most analytical keys used in descriptive floras are very complex and difficult for the average person to use. Some are difficult for the better botanists. Standard nomenclature is not adhered to and unless a glossary is contained in the text it is almost impossible to interpret meanings of the author.

For the past few years, the use of a book prepared for the layman has been found helpful in identifying many plants in connection with soil conservation work. The book is "Florida Wild Flowers."

In using this book as the basic tool, most plants of Florida have been easily identified. The keys used in "Florida Wild Flowers" are based upon (1) color of the flower, (2) character of the plant—such as tree, shrub, vine, or herb, and (3) special characteristics of the flower.

Although Mrs. Baker did not include more than a few species within the genera, she did include the more common plants. Whenever the specific plant is not described, the genus is found and by reference to a larger and complete flora the specific plant can be readily identified. In the immediate case the "Manual of Southeastern Flora," by John Kunkel Small, published by him in New York, is used as the final authority.

Undoubtedly, the use of "Florida Wild Flowers" can be extended to other sections, as many of the plants are native over a wide range within the Southeastern States and beyond. Many plants common to parts of Florida are also found as far west as Texas, and northward beyond central United States.

The use and simplicity of this book is illustrated by going through the keys to identify two types of flowering plants. We have an erect-growing, yellow, aster-like flower with alternate leaves. The stem and the few leaves are hairy, with the upper part of the stem "sticky-like." The inflorescence is a loose panicle of flowers and long peduncles.

On page 9, we find:

Key—For the Identification of Plants.

Flowers—yellow, yellowish, or orange--	Page 13
Then on page 13 we find:	
A. Herbaceous plants. Not vines	
b. Leaves alternate, toothed or lobed	
F. Leaves tubular or strap-shaped in heads	
Compositae-----	219

On page 219 we find:

Composite Family

Compositae. Flowers small, crowded in heads that may appear like solitary flowers—such as aster, dandelions, and thistles.

There follow almost four pages of descriptive material explaining this large family of plants, giving interesting items about particular ones of the group and finally an explanation of arrangement of flowers in the heads, making clear certain technicalities which will facilitate further identification. This leads to the final key to be followed.

Keys to the Composite Family

Group III. Heads ligulate. All flowers strap-shaped-----	232
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On page 232 we find:

Group III. All flowers strap-shaped. Sap milky. Heads yellow, small	
Hieracium-----	233

On page 233 we find:

Hieracium Gronovii. Hawkweed. Heads yellow, ½ inch across in terminal panicle. Pappus hairlike. Stem 1 to 3 feet tall. Leaves hairy, oblong or broadened upward, 2 to 6 inches long. Woods and pinelands. Florida to Texas and Massachusetts.

As there are a number of Hieracium species, it may be necessary to refer to Small's "Flora" to be sure of this plant. Here will be found a short synopsis of the genus, a key to the species, and a detailed description of 9 of the 300 species which are natives of the North Temperate Zone and South America.

Let us consider another plant. We have in mind a small, dainty, light-blue flower on a slender flat stem about 1 foot high, with long narrow flat leaves, somewhat grass-like in appearance. Let us identify this plant by use of Mary Francis Baker's book.

Key—For the Identification of Plants.

Flowers—Blue, violet, or purple-----	Page 12
A. Herbaceous plants	
B. Leaves alternate	
C. Flowers not in heads	
Petals separate	
Petals 3, sepals blue or violet. Iridaceae-----	45

On page 45 we find,

Iris Family

Iridaceae. Flowers 6-petal, iris blue or lavender, leaves sword shaped or grasslike.

Fruit on capsule. Flower less than 1 inch across. Sisyrinchium-----	47
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On page 47 we find two species described. If a more accurate and detailed description is desired, refer to the "Flora" or other suitable systematic botany of the region.

It is felt that anyone with just a small knowledge of plants can soon familiarize himself with the explanatory part of Mrs. Baker's book on pages 6, 7, and 8. With a little practice, on the common flowers he may know, one can learn to use the keys, and before long can satisfy his curiosity as well as add to his knowledge of local plants.

The grasses are not included in Mrs. Baker's book.

—C. B. BLICKENSDECKER.

NORTHEAST



STILL BUDDIES.—The spirit of the agricultural pioneer in house and barn raisings is being brought back to Pleasants County, W. Va., by a group of World War II veterans taking the GI agricultural course at St. Mary's. Every Friday they visit the farm of a class member and give his farm operations a big push ahead. Installation of conservation practices always gets a lot of attention.

HE WANTS IT BACK.—"Earl Wince, on the Rock Sun road, lost his conservation farm plan between his home and the Nine Mile meetinghouse a week ago Thursday. It is in a brown paper envelope 10 to 12 inches long, with his name on the outside. He would appreciate getting it back because it serves him well as a guide in using his land to advantage. It contains adapted seed mixtures and soil treatments needed in each of his fields, and other farming memoranda that a man can't carry in his head."—Pleasants County Leader, St. Marys, W. Va.

MAGIC FORMULA.—"Brome O Grass" is the name L. E. Cumby, Falls Mill, Mercer County, W. Va., farmer has given a 2-acre meadow. It was seeded 2 years ago with 10 pounds of brome grass, 5 pounds of orchard grass, 5 pounds of alfalfa, and 2 pounds of Ladino clover. Last year Cumby took three heavy cuttings off the field. A fourth crop developed, but he decided it would be better for the ground if he let it stand.

Only a few years ago, after several years' production of corn, this meadow was the worst eroded field on the farm.

In 1945, before planting the last crop of corn, Cumby limed the field and applied several tons of manure and 600 pounds of 0-20-0 fertilizer. He followed the corn with wheat and applied 600 pounds of 4-12-4 fertilizer. In the fall of 1946 he sowed a cover crop of rye that he turned under the next spring, before he sowed the "Brome O Grass" mixture and applied 300 more pounds of 4-12-4. Later in the summer he top-dressed with 300 pounds of 0-14-7. In 1948 he top-dressed again with 600 pounds of 0-14-7. In May of this year he gave the meadow a similar application.

REED CANARY GRASS.—Everett Moses, a cooperator in the White River Soil Conservation District at Royalton, Vt., thinks a lot of his reed canary grass pasture, a 2-acre piece that not so long ago was waste land because it was so wet. In 1945 a small creek overflowed and spread over the flat. Moses asked SCS technicians to do something about it. Next spring they started out by partly draining the tract. A seedbed was prepared in the dry season of 1947 and seeded down with reed canary grass, timothy, and Ladino clover. In the spring of 1948 grazing started. The 2 acres provided night pasture for 17 milkers. Even with intensive grazing, at times it looked as if it would be necessary to mow to keep ahead of the growth. Although Moses had a fall herd, milk production went up to 50 pounds per day when he turned the cows in.

This year, grazing was started in April. In June the grass was still well ahead of the cows.

STUBBORN FIELD.—For four generations members of the Easterbrook family unsuccessfully tried to clear and get some use out of a 20-acre field back of their barn. Then SCS engineers working with the South Worcester (Mass.) Soil Conservation District came along and lined up a drainage system, helped Harold Easterbrook get needed equipment, and supervised the work. Not all this installation has been completed, but at least half of the field has been plowed and seeded and the rest of it will be in production before long.

PROGRESSIVE LEASE.—For the first time in New Jersey, a lease for a Sussex County farm contains a clause requiring the lessor to operate in compliance with soil conservation practices. It is included in the 3-year agreement between Earl Price, farm owner, and Jacob Krotje, lessor.

The 135-acre farm is in the Morris-Sussex Soil Conservation District. George Geary, one of the district directors, says the lease guarantees that work already

started will be carried to completion and that the farm will become a guide for other farmers who wish to follow the complete farm conservation plan. All but 5 acres of the farm are tillable.

STONE-REMOVAL SPEEDED.—A specially constructed 10- by 12-foot stoneboat, of lighter construction than commonly used with bulldozers, now speeds up stone-removal projects near Bristol, Mass. It is of quarter-inch steel plate. Chief advantage is that when empty, after depositing a load, a farmer can haul it back to the point of stone removal with a farm tractor. This gives time for the bulldozer to get another load ready.

Out of their experience in various methods of stone removal, SCS technicians at Segreganset conclude that the most efficient service can be obtained from a bulldozer when it is used with a large light stoneboat and a farm tractor. When only a bulldozer is used, much time is lost in pushing stones out of a field. Excavating a trench, pushing an old wall into it with a bulldozer, and then covering the trench was found to be time consuming and expensive, and there was the risk of further delays from encountering stone, hardpan, or quicksand. In the most effective use of machines, stone and other materials were pushed on the steel stoneboat, pulled out of the field to a large depression, and scraped off with the "dozer." This made it possible to get the bulldozer back into position for pushing another load onto the boat, with the farmer hauling the boat back with his tractor.

PARTNERS IN PROJECT.—B. Franklin Bishop and William W. Nichols, Upper Pittsgrove Township farmers in the South Jersey District, N. J., have completed 6,500 feet of drains.

When they decided to pool their efforts in attacking a common problem, technicians working with the district made the surveys and prepared plans. The farmers jointly rented a bulldozer from the district at a nominal cost and established a V-type header ditch along the line where the two farms came together. From this, 2,900 feet of laterals were built to the wet areas in Nichols' farm and 3,600 feet to like areas in Bishop's acres. They split the costs on a proportionate basis, each paying much less than his expense would have been had he proceeded separately. They got the work done more quickly, too.

FIGURES ON DITCHING.—When an avalanche of requests for use of a new tile ditching machine hit the office of the supervisors of the Greenbrier (W. Va.) Soil Conservation District, they set up a schedule and limited installations to 25,000 feet per year in each of three counties, Pocahontas, Monroe, and Greenbrier. That's all that can be handled in a year by the technical men who do the surveying and planning.

The district has just hung up a neat low-cost production record. In a run of 44,349 feet of ditching started last October, the average cost per foot to cooperators for the use of the machine was 3.4 cents. It had been anticipated that the cost would average 4.5 cents per foot. In installing this amount of tile the ditching machine was operated 169 hours at an average digging rate of 262 feet per hour. Because the over-all cost of operating the ditcher in 1948 developed a loss, owing to the large number of repairs required, the supervisors have boosted the rate farmers pay from \$9 to \$11 per hour. Even at the new rate, the cost on the 44,349-foot job would have averaged only 4.1 cents per foot for use of the machine, still under the estimates.

GREEN PASTURES.—Arthur Leland and sons, farmers at East Bridgewater, Mass., had been bothered for years because they could get only poor grass from a 10-acre field. It was too wet for any kind of production. Technicians in the Plymouth District laid out a drainage system and a land-clearing program. A shallow ditch, parabolic type, did the job. The Lelands got "a wonderful crop" of clover and timothy. Other conservation installations gave the Lelands "very good pasture," so good that they became one of the three Green Pastures contest winners in Massachusetts in 1948.

BROMFIELD FOLLOWER.—A junior Malabar Farm is starting to grow up in Ipswich, Essex Soil Conservation District, Mass., where B. H. Warburton, a friend of Louis Bromfield, pappy of the original Malabar Farm, has purchased 275 acres. Warburton studied soil conservation measures while visiting Malabar Farm near Mansfield, Ohio, and is anxiously awaiting the time when he will have his own complete farm conservation plan in operation.

He has a big job on his hands because the farm had been idle for years. He had to start from scratch. He is now plowing, fertilizing, and reseeding meadows and pastures so that he will have support for a dairy herd. Two existing farm ponds are to be cleaned and deepened. A drainage system is to be installed. All of the old stone fences and hedgerows are to be replaced with living fences of *multiflora rose*. He is a lover of wildlife, so naturally there will be plenty of wildlife cover provided.

ATTENTION: DISTRICT OFFICERS

All subscription orders for this magazine should go directly to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. They should be accompanied by check or money order, \$1 per year in advance, and typed or clearly written names and addresses.

Many soil conservation districts are providing yearly subscriptions to their governing bodies, and also to new district farmer cooperators. See pages 33 and 47 of this issue for examples of uses to which this publication is being put.

SOUTHEAST

ORDERLY SEQUENCE.—Better farm conservation plans are being written in the Northeast Alabama Soil Conservation District since those responsible for them have learned to say "no" to farmers who are interested only in single practices. This is especially true in the matter of water disposal systems.

One farmer wanted his 700-acre cotton farm terraced but wouldn't agree to establish the outlets. When he finally did come around, the farmer put in eight meadow outlets before building a single terrace. His land lies between two main highways and presents an excellent example of a complete farm water-disposal system. And he has a higher regard for his outlets than for any other conservation practice on his farm.

VICE PRESIDENT BARKLEY SPEAKS.—"We must keep ourselves strong by the conservation of all our resources," Vice President Alben Barkley said in an address at the farm face lifting on Reinhardt College Farm in northern Georgia. "We are all united in this great program to preserve America for ourselves, our children, and our children's children. What we are witnessing here today should never have been necessary—the reclamation of land that we have wasted. This process of land destruction went on until it was necessary for the Government of the United States to inaugurate a Nation-wide soil conservation program. The problem of our Government and our people is to preserve the land that is left. We are trying to educate our people to the fact that there is a science of the soil. And we are witnessing today a symbol of the workability of our form of society. Let us Americans, without regard to politics, race, religion, or any other differences, join together and hand down to future generations a Nation rich in resources and the traditions of freedom."

FOOD FOR THOUGHT.—Parke Anderson, president of the Florida Association of Soil Conservation Districts, wonders if supervisors have given enough thought to telling the conservation story to both urban and rural people. "Really, conservation is more important to the city folks than to the farmers," he says. "Figure it this way: One hundred and fifty years ago, 19 farmers supplied the needs of 20 people for food and fiber; 1 person, therefore, could live and work in the city. Seventy-five years ago, 8 farmers supplied 10 people, and 2 could live in the city. Today, 1 farmer provides supplies for 4 people. All supplies beyond the farmers' needs go to cities. If farmers have only enough to live on, city people will starve. Without our program, fields that used to be fertile became unproductive. It is only through conserving the soil today that we provide a surplus to feed cities."

TUNG COVER.—Byrd Holloman of Mississippi is not satisfied with either summer or winter cover crops on land used for tung-nut production. He wants to grow both on the same land each year. Here's why. "Where we plant cover crops, both winter and summer, we expect yields to double," he explains. He cites his experience managing one 808-acre tract of tung trees. "We planted half the tract to Alyce clover. There, trees grew about a third larger and produced twice the amount of nuts because of the clover. Those trees were the last to lose their leaves last year and probably will be the first to put out leaves this spring." The Mississippian manages five separate farms, using a complete soil and water conservation plan on each. He is a commissioner of the Stone County Soil Conservation District.

EIGHT TRENCHING MACHINES.—Eight large trenching machines have been purchased in eastern North Carolina for laying tile drains as a result of demonstrations with a machine owned by the Soil Conservation Service. The latest was purchased at \$8,650 by a score of farmer-stockholders in the Lenoir County Drainage Corp. for

carrying out drainage operations planned by technicians in the Southeastern Soil Conservation District. Several large trenching machines also have been acquired in South Carolina and Virginia.

ARSENAL LAND.—Officials of the Milan Arsenal in west Tennessee realized in 1947 that the land they were leasing to farmers for agricultural use had varying capabilities and needs. That's when they called on SCS men to help determine the use and treatment of each acre available for lease to farmers. Last year six SCS soil scientists led by Nathan I. Brown made a complete survey of the area. Now, armed with colored maps showing land capability classes and Gibson County Soil Conservation District's "Guide to Safe Land Use and Treatment," the arsenal officials lease land for 5 years at a time under terms that will insure conservation of soil and water.

PROFIT FROM KUDZU.—J. P. McMichael of Wayne County, Miss., is a great booster for kudzu. In 1947, he harvested and baled hay that brought \$300—\$65 per acre from each of the 5 acres in kudzu on his Mozingo community farm. This entailed an investment of only 6 man-days, because McMichael used the farm tractor in harvesting it.

Last summer, despite rainy weather, he put in the barn 240 bales, and later sold 100 bales for \$100. All this came from 5 acres once "worn out."



DENMARK BOUND.—Aksel Pedersen, a dairy and poultry farmer of Jackson County, Miss., a native of Denmark, plans to visit the old country on profits from conservation farming.

Pedersen told commissioners of the Jackson County Soil Conservation District early this year that his conservation farming had taken him out of the red. "Last winter I lost about \$400 during the winter months. This winter I am making a profit. I attribute this to the pastures that I have started as a part of my conservation plan," Pedersen told them.

"Eighty percent of my land is now green with fescue, Bahia grass, and crimson clover. At first I had the 'cart before the horse'—cows but no pasture."

FROM FRIEND TO FRIEND.—Jackson County Soil Conservation District in the Southern Appalachian Mountains of Kentucky got an early start in group action. While the district was being organized, District Conservationist E. A. Oren took the supervisors identified with two communities on a tour of an adjacent district. There they saw their first terraces, Kentucky 31 fescue, kudzu, and sericea. With the aid of the two supervisors, 26 neighborhood leaders in the two communities were selected and conservation surveys were made immediately on the 26 farms. The neighborhood leaders were divided into two groups and meetings were held in February 1948. A wall-size chart of the best known farm in each community was displayed and each farmer had a colored planning copy of the map of his farm. Questions during the meetings indicated that most of the farmers got a fair knowledge of the capability classifications on their farms. Colored slides were used to illustrate a discussion which followed on conservation practices.

Farms of the two supervisors were planned in March, but a farm planner was not available for general planning work until May. In the meantime, the groups visited two or three other farms where outstanding examples were seen of terracing, sericea, kudzu, and pond-building. The farm planner reports that planning was easy and that application is well ahead of schedule. At the end of the first year, 16 of the 26 farmers had established Kentucky 31 and Ladino clover pastures; 7 had constructed 66,000 feet of terraces and diversions, and 7 were awaiting terracing equipment; 12 planted 76,000 kudzu crowns; 10 seeded 49 acres of sericea; 11 built 15 farm ponds and 5 more are awaiting service by the district pond-building equipment. Most of the practices were established along well-traveled roads.

As the work progresses, the farm of each neighborhood leader will become the nucleus of a neighborhood group.

LOVE THAT FESCUE.—When Sam Casey, of Stonewall, N. C., turned his herd of dairy cows into his fescue-Ladino clover pasture for the first time, they didn't want to leave. After letting them graze about 45 minutes, he tried to drive them out, but they began to jump back over the fence, and several of the cows were cut by barbed wire. "There was no keeping them out after the first taste," Casey said.

FUNDAMENTAL TRUTH.—The *Smithfield* (N. C.) *Herald* in an editorial on "Tobacco and Soil" comments as follows: "What we often fail to acknowledge is the simple, obvious reality that the prosperity of any agricultural region stems from the soil, and only secondarily from the plants that grow from the soil. If anyone doubts this failure to acknowledge a fundamental truth, let him consider why most farmers and businessmen usually show less concern over soil depletion and erosion than they do over weather or price conditions that adversely affect the gross agricultural income."

BUSY BEAVERS.—Last fall a colony of beavers decided that a fish pond on the J. Hawley Poole farm in Moore County, N. C., would be a good place to settle down. And

because of this Poole got more wildlife than he had bargained for.

After the beavers built their home at the upper end of the pond, they decided to raise the water level. First, they stopped up the riser pipe with leaves and sticks. This raised the water about 6 inches, but then water started running through the spillway. They soon remedied this situation by building a semicircular dam about 18 inches high across the spillway.

While this gave the beavers enough water around their new home, it left only about 6 inches of freeboard on the dam. This did not suit Poole, for he was afraid that in case of a heavy rain the dam along with beavers, fish, and water would all leave the farm.

It was a case of man against beast. As fast as Poole would tear away a section of the beavers' dam across the spillway, they would promptly build it back. Poole, who is president of the North Carolina Association of District Supervisors and chairman of the Upper Cape Fear Soil Conservation District, took all this rather philosophically. Said he, "If the average human were as industrious as the beaver, there would be very little poverty in the world today."

EIGHT-YEAR EPIC.—District Conservationist C. R. Lamb, Greensboro, N. C., opened his mail to find a long letter of appreciation from V. Eugene Coltraine, a co-operating farmer of Haw River Soil Conservation District. His spirits ran high that day. And no small wonder. Here, in part, is what Coltraine wrote:

"My erosion problems are solved. I can now enjoy a good big rain such as we are now having.

"When I signed up to carry out soil conservation practices, I had only one 14-foot granary and it held all the corn and grain that I grew. In a short while, I built a two-story 16- by 20-foot granary, thinking it would hold all that I would ever grow. Now I have my third granary two stories high, 18 by 30 feet, and I am cutting logs to build a double crib 24 feet long this spring. All this happened in 8 years, since I signed up with the soil conservation district in 1940.

"I need all the rain that falls now. It goes into the earth. I have a new spring on my farm that hasn't been dry in over 3 years—where before there was no water. Also, the earthworms work in rich, well-balanced soil that allows water to soak in.

"You know, farming the conservation way takes the drudgery out of farming and makes it a pleasure."

LIKES THE RESULTS.—John Shaw, cooperator in the Kenton County Soil Conservation District, Ky., built probably the first terraces in the county with the help of the district. Now he has 26 acres protected by terraces. Shaw says he doesn't exactly like terraces, but he likes the results he gets from them.

BETTER AND EASIER.—To Richmond McInnis, a commissioner of the Three Rivers Soil Conservation District, Miss., a completed soil and water conservation plan has meant "a better living a little easier." And that's not all. "There isn't as much dust and muddy water as there used to be," he explained to other commissioners early this year. According to McInnis, he had been "hit-

ting and missing" with row crops when the district was organized. Now, he has 20-odd acres in kudzu, 50 acres in pasture, 5 acres in Kentucky 31 fescue, and 5 acres of Bahia grass and reseeding crimson clover. This leaves little room for row crops, and the Mississippi farmer likes it that way.

UPPER MISSISSIPPI



OFF TO RIGHT START!—The district commissioners in the Davis County, Iowa, Soil Conservation District have voted to give a 1-year subscription to SOIL CONSERVATION Magazine to each new cooperator who signs a soil conservation farm plan with the district.

REALISTIC MODELS.—The Hancock County (Ill.) Soil Conservation District, in cooperation with the county superintendent of schools, sponsored a conservation exhibit contest for elementary schools last spring. Each school had but 2 weeks to prepare its exhibit.

First place was won by the LaHarpe eighth grade, second prize went to the Colusa seventh and eighth grades, and third was won by the Franklin school.

Prizes of \$25, \$15, and \$10 were provided by a Carthage bank.

Hancock County is divided into nine school districts, each of which had its own contest. The soil conservation district directors selected the best three in each school district to compete for awards.

Exhibits included unusual model farms made of sawdust and glue or crumpled newspapers covered with papier-mâché. One was a sand table using real soil planted with actual crops in strips and on the contour.

WESTERN GULF

GARDEN CLUB.—Soil conservation is standard procedure for the Hubbard Heights Garden Club, Fort Worth, Tex. Soil management is applied to flower beds and nearly every member has a compost heap. Grass is planted on ramps in yards and each member is careful not to cause erosion when watering the garden.

At the club's annual flower show this year, space was

devoted to a soil conservation exhibit—see picture. Mrs. C. R. Bullock is president. Chairman of the conservation committee is Mrs. J. C. Carroll.



SOUTHWEST

STOP-GO PLAN.—The Arizona Association of Soil Conservation Districts believes it is on the road to solving its troublesome equipment problem, according to I. O. Rasmussen, president.

A system has been worked out for rotating, transferring, and generally making the most effective use of the machinery available to the districts, and it is expected that the plan will be approved shortly.

WATER GOES FARTHER.—Edward Sorenson, a cooperator of the Kamas Valley Soil Conservation District, Utah, is carrying out a progressive water conservation program which includes the leveling of each field on his dairy farm as old stands of alfalfa are plowed up.

Early in 1947, a Parshall flume was installed in the main irrigation ditch, where it enters the farm, in order that water diverted to each field could be measured.

In 1947, on one of these fields, 3.16 acre-feet of water per acre was used in producing 104 bushels of oats to the acre. This field was leveled and again seeded to oats in the spring of 1948. After this field was leveled, only 2.5 acre-feet of water per acre was needed for efficient irrigation.

WARRING ON ALKALI.—Poor drainage and heavy deposits of alkali present major problems on many farms

in the Arkansas River valley of southern Colorado. District farmers are carrying on a battle to alleviate these conditions, the most ambitious effort probably being that of the Hawley Drainage Association.

Eighteen cooperators of the East Otero Soil Conservation District have formed a voluntary association, which believes it can reclaim nearly 30 percent of 2,000 acres which have gone entirely out of production because of alkali.

It will take time and it will cost some money. This part of the program is being carried out by assessment on the basis of individual benefit. The association has a lawyer who is working out, with the advice of SCS technicians, a division of costs fair to all 18 members.

The plan calls for a huge main drain of the open type through the area from northwest to southeast. The upper portion of this main ditch was constructed during the winter and will be fed by drainage laterals as necessary. Some of these will be tile and some open. As drainage improves and alkali deposits gradually are flushed and leached out, land which has been out of use will be returned to production. Sweetclover will be one of the first crops planted in these reclaimed areas.

Importance of the problem is pointed up by the fact that probably not more than 20 percent of the 2,000 acres was entirely unaffected by alkali, and the worst areas were increasing steadily. An extremely involved study by SCS technicians preceded the start of construction.

These technicians outlined the affected areas. Then they made a soil survey which took into account changes, textures, topographical features, and land use. This study carried to a depth of 5 feet. Test wells were sunk and fluctuations in water table were recorded every 2 weeks for a year. Then the area was charted on a grid, stakes were set at intervals of 330 feet, elevations were taken, and nearly 1,000 deep holes were bored with an auger.

When all of this was done, the technicians had detailed information on underground water flow and soil features. They knew where water was coming from, and where it was going. This information will be the basis for future construction of drainage facilities.

LABOR COSTS CUT.—Improvements made this year by landowners of the Barranco Alto irrigation ditch system will reduce maintenance labor by 35 man-days annually and result in more efficient use of water, according to J. A. Gomez, manager, and Pablo Sena, mayordomo, of this community ditch in Santa Fe County, N. Mex.

Before the improvements were made the ditch was being damaged by the sloughing of earth from banks ranging from 2 to 12 feet high for a distance of 500 feet. The caving of the banks was blocking the flow of water, cutting down the quantity available for crops and gardens. In addition, the Nambe River was digging into the lower bank of the ditch, and the overflow from a high ditch was causing damage.

Notwithstanding expensive maintenance work, the ditch was gradually getting worse. Therefore, it was decided to seek assistance from the Pojoaque Soil Conservation District.

A complete conservation plan was worked out by Gomez and Lawrence K. Sandoval, representing the Soil Conservation Service. Under its provisions, 260 feet of heavy brush jetty has been constructed to divert the river, 500 feet of 18-inch helcor pipe has been put in to prevent bank-sloughing, a pressure-type division gate has been installed, and an 18-inch 20-foot undershot has been constructed to protect the ditch from upper drainage.

"The labor and time we formerly spent on maintenance now can be applied to the improvement of our individual farms," Gomez reports.

MACHINERY ON CALL.—The Upper Arkansas Soil Conservation District, Salida, Colo., has 20 pieces of farm equipment which it rents to cooperating farmers and ranchers.

In setting up the equipment program, district supervisors adopted the policy of leaving the heavy earth-moving jobs to contractors while the district purchased small equipment that can be pulled by farm tractors for the less difficult jobs.

On December 31, 1945, the district had only 1 piece of equipment valued at \$220 but now it owns 20 pieces worth more than \$3,000.

Walter Sneddon and Elvis Starbuck, co-chairman of the equipment committee, are in charge of the machinery. Included are land levelers, trashy-tillage plows, a drill with grass-seed attachment, a combination grain and fertilizer drill, a uni-tiller chisel, two horse-drawn graders, a caterpillar grader, two horse fresnos, two tumblebugs, a cement mixer, a 400-gallon water tank, ditchers, and forms for prefabricating irrigation structures.

WATER SOURCE TAPPED.—A group of farmers in the Pojaque Soil Conservation District of New Mexico have completed a project which they believe will increase their supply of irrigation water by 25 percent.

Since the Nambe River, their source of supply, sometimes does not run a sufficient flow in summer, farmers in the El Cano ditch system have installed 360 feet of 8-inch pipe in the swampy area along the river to tap underground water. Part of the project was a headwall designed to keep a sandy wash in its channel and prevent sediment and erosion damage to the irrigation system.

Twenty-six farmers, operating 217 acres of land, now are guaranteed a permanent supply of water for gardens and orchards.

SCD GIVES MAGAZINE TO ALL COOPERATORS.—Word from Grant Anderson, district conservationist at Tucson, Ariz., is that the Pima County Soil Conservation District now buys a 1-year subscription to SOIL CONSERVATION Magazine for each of its active cooperators. The district charges a minimum handling fee of \$10 for district assistance and pays for the year's subscription out of that. Presumably, the practice will be continued and each new cooperator will receive a subscription.

PACIFIC

MANAGED WATER.—When soil conservation work was started in the Latah (Idaho) Soil Conservation District, one of the first things stressed was the grading and seeding of the gullies draining small watersheds. (See page 24, August 1949 issue.) Seeding of gullies provided the seed source that had been lacking for years.

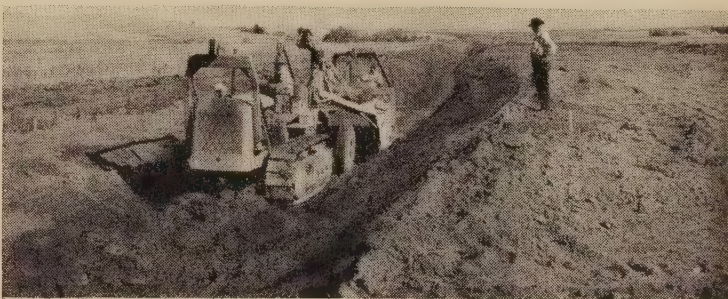
In the uplands, planned, properly shaped waterways are proving to be good soil savers. Farm equipment can cross them, enabling farmers to use contour operations.



Watercourse on Chris Deestan farm south of Moscow, Idaho, was shaped and seeded by CCC crew in 1937.



Same water course 10 years later; result of good maintenance.



Enlarging and straightening channel on George Ernst farm, near Genesee.

And there is less breakage of farm machinery when ditches are smoothed out.

Good drainageways are a big help in the bottom-land areas, too.

Farmers using planned drainageways actually have more land under cultivation today. Most of them are harvesting a hay crop from their waterways. They have found it pays to maintain the drainageways.

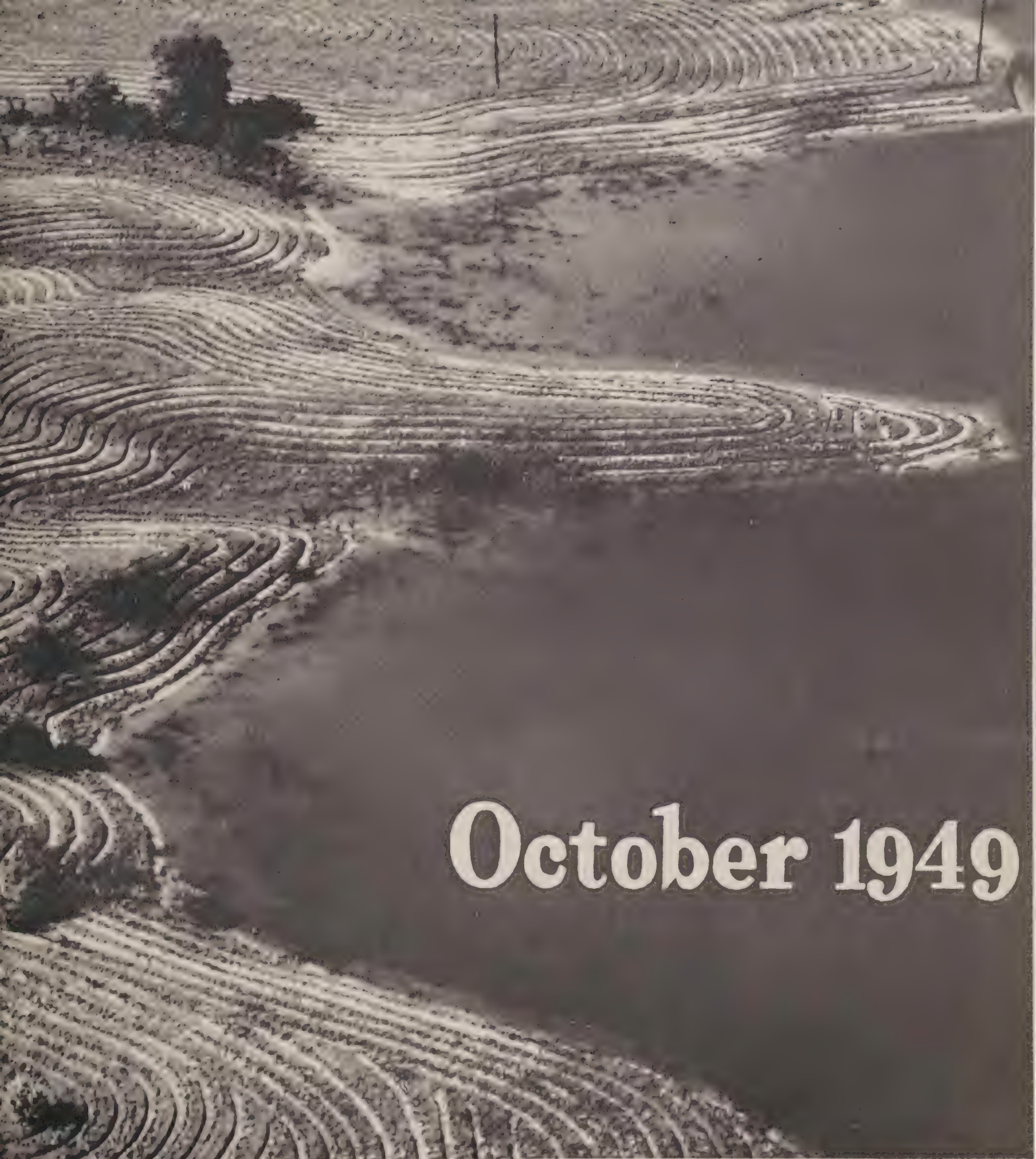
MODERN SOIL CONSERVATION

BY HUGH BENNETT

MODERN soil conservation is based on sound land use and the treatment of land with those adaptable, practical measures that keep it permanently productive while in use. It means terracing land that needs terracing; and it means contouring, strip-cropping, and stubble-mulching the land as needed, along with supporting practices of crop rotations, cover crops, etc., wherever needed. It means gully control, stabilizing water outlets, building farm ponds, locating farm roads and fences on the contour, and planting steep, erodible lands to grass or trees. Modern soil conservation, moreover, consists of doing these and still other necessary things. Where the land is too wet, modern soil conservation calls for drainage; if it is too dry, it calls for irrigation; if subject to wind erosion, it calls for stubble-mulch farming, wind strips, and windbreaks. If plant nutrients have been depleted, it calls for fertilization; if water-soluble salts have accumulated in toxic quantities, it calls for leaching out of the salts by flooding. And modern soil conservation calls also for the use of the best of the most adaptable varieties of crops, as well as the most efficient tools available to farmers.

Each measure is applied to meet a specific need, as determined by actual physical analysis of the land through soil conservation surveys, wherein each individual parcel of land is classified according to kind and need. Combinations of mutually supporting measures are very often used to safeguard the more hazardous types of land and what is done in one place is adjusted to the needs of adjacent land.

There is no other way to carry out a successful job of lasting soil conservation: the kind that can be maintained on the land permanently. This is a condition imposed by nature, not by man, although man's treatment of the land frequently has altered the natural conditions in ways that necessitate special treatment. There is no substitute for this painstaking, scientific procedure, and certainly there is no panacea for soil erosion. Trying to get the job done on a permanent basis in any other way will surely yield futile results. And what is to be gained from temporary soil conservation, beyond some momentary advantage that doesn't cure anything?

An aerial photograph of a terraced hillside. The terraces are curved and follow the contour of the land, creating a series of concentric, wavy lines. A dark, rectangular pond is situated in the upper right portion of the image. The overall tone is sepia or aged black and white.

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HUGH H. BENNETT

CHIEF, SOIL CONSERVATION SERVICE

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☆ THIS MONTH ☆

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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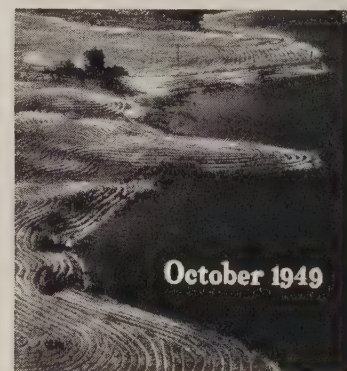
SPECIAL ISSUE.—This month we speak of water: of water in companionship with Earth and Man.

We look to the skies, the mountains, the forests, and the fields. We contemplate water quiet and contained, and water excited, raging, and uncontrolled. We note the gentle raindrop, the trickle down an irrigation ditch. We see water in laboratory and in industry.

All life, every living organism, amoeba, corn stalk, mallard, trout, eel, angleworm, electric power and transportation, every job, every ambition, every human soul upon the face of the globe, exists by blessing of water.

This issue tells but one small chapter of the story. SOIL CONSERVATION Magazine publishes the newest findings in drainage, irrigation, pond-building, sedimentation and percolation studies, flood-control progress, water-management methods, in its month-by-month coverage of the Nation's program of soil and water conservation.

THE EDITOR.



FRONT COVER.—Where land and water meet. An interesting pattern along the shores of Lake Atwood, Ohio. Under the direction of H. P. Garritt, SCS forester, young conifers are planted in contour ridges—a part of a vast reforestation program which embodies more than 46,000 acres, most of which were abandoned farm land within the Muskingum Watershed Conservancy District. More than 2,000,000 young conifers, principally red pine, white pine, and pitch pine, have already been planted as part of the district's program to bring back the forests of yesterday to north-eastern Ohio and to insure a prosperous future. Photographer: Herrin F. Culver.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

ALL LIFE DEPENDS ON WATER

By DANIEL L. SECKINGER

AN EARLY description of the appearance of water in the universe is found in the story of creation (Genesis I:9-14), where it is stated that the waters were "gathered together unto one place," called the seas, and after this the "dry land" appeared. How long after the waters receded before life began on the land no one knows, but there is geological and other evidence that there was an orderly sequence of development culminating in the appearance of man. Throughout the development of all forms of organic life, there has been absolute dependence upon water for growth and maintenance; its requirements for all forms of life are universal. With the appearance of organic life upon the land, the relationship between land and water became fully established.

In addition to land and water, a third element of great importance to life is the air, which makes available oxygen and nitrogen, gaseous chemicals essential for metabolism and growth, and also radiant and electrical energy, essential to the spark of life. Without the latter, there would be no life on this planet. The physical universe would consist of desolate wastes of inanimate rocks, barren soils, and water.

Nature has provided ample amounts of land, water, and air for the propagation and maintenance of all forms of life. When America was discovered, our soils were virgin because the Indian had no need for extensive agriculture, and historically this is true of a number of ancient civilizations who thrived for a while on erstwhile virgin soils now long since abandoned to become arid desert wastes.

Man, like the pathogenic microbe, is destructive of the substances or elements upon which he lives. He is destructive of the land upon which he thrives, and the microbe is destructive of living tissues. Pathological changes take place in both instances which make future living or existence for the mi-

crobe or man difficult or impossible. It is conceivable and even possible that the devastating effects of our present or future generations will so alter the land that it will not support life. The poet Byron immortalized in verse the ravages of man upon the land: "Man marks the shore with ravage but his control stops with the deep," which is another way of saying that man destroys the land upon which he lives, but he cannot destroy the ocean because he cannot live in it. It is generally true also that man cannot destroy the air because of its vastness, although in some instances he has become a polluting factor that from a public health point of view seriously affects the health of certain villages and cities. The nuisance factor of man's ravage of the air is even more extensive because it is applied more widely.

The only difference between man and the pathological microbe as a factor of self-destruction is that man has intelligence; he is able to measure the extent and duration of his destruction. He knows, for instance, that one time there flourished about the valleys of the Tigris and Euphrates virile civilizations that disappeared because of wanton soil erosion practices. On the other hand the germ of tuberculosis, by way of illustration, invades and ruthlessly destroys the body upon which it lives, eventually to be destroyed itself upon the death or recovery of the individual, without knowledge of the injury and destruction it creates. The only hope of survival of the microbe is that it will become implanted in another being where the process of destruction will be repeated. Man's hope of survival in the past to a large extent has also been his ability to invade new and productive virgin soils. There are, however, no new, virgin soils to be conquered and ravished by man. He must depend upon experience and intelligence to extricate and free himself from the dangers of extensive land destruction.

In the evaluation of water, land, and air in the processes of life, it appears the critical point of approach for us pivots about water and the land. The air is free and bounteous and not under direction or control of man to any large extent. Water is also as boundless as the ocean itself, but

NOTE.—The author, who holds the degrees of A. M., M. D., and Dr. P. H., is assistant health officer, coordinator, health and hospitals, District of Columbia Health Department; member of the Interstate Commission on the Potomac River Basin for the District of Columbia, and chairman of the Land Committee.

water in the ocean, without its revitalizing and rejuvenating effects upon the land, would be valueless.

The relationship between land and water is, therefore, all important and vital to all forms of life upon the land. If nature provided ample amounts of water, and no more, at the right time, the problems of deserts, dismal swamps, destructive hurricanes and floods, soil erosion and leaching, would vanish from the earth.

Nature, however, cannot supply just the right amount of rainfall at just the right time for every square foot or even every square mile of land, but she attempts to furnish barriers and buttresses against floods and drought in the form of forests, lakes, rivers, underground water, vegetation, and humus. It is only necessary to visit some primeval forest to appreciate nature's safeguards in holding and filtering rainfall. Here, even during rainy seasons streams flow in almost pristine clearness due to forest and other vegetative effects in the process of filtration and the prevention of too rapid runoff. The end result is the provision of ample food and water supplies for animals and plants. Each, in turn, has its peculiar effect upon other forms of life, and finally returns as nitrogen in an ever-recurring cycle for the continuation of life on this planet. In such a setting, each product of nature plays its own peculiar role in the economy of life. Even the discarded antlers of the wild stag furnish essential minerals to rodents and other small animals.

Of the three elements—land, air, and water—water is most malleable and admirably adapted to the uses of man. It has been described as "a gentle servant or a monster." It provides contentment for man in the gently flowing rain, the restful quietude of sylvan verdure and babbling brooks, the tint of the rainbow and kaleidoscopic skies. It is a balm to the fevered brow, a palliative against pain and myriads of other human ills. Gently and quietly during the night it soothes, bathes, and revitalizes tired and debilitated tissues and vital organs; it promotes sleep; gathers, transports, and discharges harmful toxins and human wastes. Surely and beyond any shadow of doubt its beneficence is boundless, incomparable, and beyond description by tongue or pen. It is as imponderable as life itself, boundless as the oceans, gentle as the breezes and the raindrop, but at the same time, dynamic beyond description. Its demands of man, who regards it on the hillside, are

not beyond his power to comprehend or conform. It conforms itself to a forest and hillside pattern generally within the realm of human knowledge to appropriate and use. When abused, however, it is relentless in its retaliation, deadly destructive in its force and rampage, from erstwhile forest glen to the ocean. At such times, as raging floods, it assumes monster proportions, and like an infuriated and prodded giant appears bent upon the destruction of the handiwork it has created.

To add insult to injury, man not only provides for erosion and hapless, devastating floods by careless agricultural methods, but dumps waste products of industry and human sewage into rivers, lakes, and the ocean itself, and nonchalantly affirms that water in time will purify itself. It is fortunate indeed that it has this property, but the time interval between the points of pollution and purification is in most instances too long, too destructive of property, too costly, and too hazardous to health. The water-borne epidemics of typhoid fever during the past half century testify grimly of man's inhumanity to himself and to our streams. In order to free himself temporarily of human wastes, without forethought or caution, he dumped typhoid-laden sewage into our lakes and rivers, with catastrophic results. It has taken more than a quarter of a century to extricate ourselves partially from this obnoxious practice and menace to health.

As the population of the country increases and agriculture is extended to meet the demand, another danger lurks upon the horizon. "Hidden hunger," or qualitative dietary deficiency, confronts men of medicine and agriculture. Our virgin soils contained the necessary minerals and vitamins for intra-uterine life, as well as from birth to the grave. This is no longer true. Serious nutritional deficiencies occur out of exhausted and eroded soils for plants, animals, and man. Man in the last analysis is most deeply involved and concerned, for he lives on plants and animals. By way of illustration, a child cannot obtain sufficient calcium to develop sturdy, bony framework if its vegetable diet is deficient in calcium because of lack of this element in the soil upon which the vegetable grows. Neither can a cow provide calcium in milk if she feeds upon grass grown upon a soil deficient in calcium. Calcium, phosphorus, and potassium have long been recognized as essential soil minerals, but more recently iron, copper, zinc, chlorine, sodium, magnesium, manganese, silver,

boron, nickel, aluminum, arsenic, fluorine, and iodine have been added to the list as "trace" elements, because they are vitally essential even though they are required in minute amounts.

Fortunately, in this country the problems of nutrition and soil and water conservation have been recognized before it is too late. The Department of Agriculture, in all of its important branches and relationships, is fully cognizant and operative against the dangers of soil exhaustion and erosion, brought about by improper cultivation methods, lack of forest and wildlife protection, and an inadequate understanding of the relationship that exists between soil and water. Its efforts and influence in the community is tremendous. Friends of the Land, a nonprofit, nonpartisan society for the conservation of soil, rain, and man, met in Washington 9 years ago, because it was "felt there was a job to be done" which "could be achieved only through information, knowledge, and education." In this capacity it is a power for good throughout the country. The anti-pollution bill, passed by the Eightieth Congress, and signed by the President, will bear directly upon municipal, industrial, and soil pollution problems that affect our streams. River compacts such as the Potomac River Commission, and large metropolitan newspapers, are also in the vanguard of

the movement to free our streams of harmful organic and inorganic wastes.

The outlook for immediate amelioration is hopeful and promising, but the movement must be brought forcibly to every home and fireside, whether rural or urban, producer or consumer, for every citizen is vitally concerned in the movement to bring health, happiness, and longevity.

The Biblical injunction that the sluggard should go to the ant and consider her ways in its implications is as pertinent in water management and soil conservation matters today as it was thousands of years ago. We should consider the raindrop from every angle and point of view—its potentialities for good as it unites with fellow raindrops on the sylvan hillside—and follow its progress to a small stream or river. If it emerges as a gently flowing stream of glistening clearness even during a rainy season, the purposes of nature have been fully accomplished. On the contrary, if it is on rampage, turbid and soil-laden, the purposes of nature have been thwarted. In an agricultural community, can this be prevented? That is the problem. But the way of the raindrop is clearly indicated and defined, and the lessons we learn from it and the practices we adopt are tantamount to our national health and existence.

GROUND-WATER SITUATION OF THE UNITED STATES

By **GARALD G. PARKER**

ADMITTEDLY, the title of this paper sounds ambitious, and to write a comprehensive report on the ground-water situation of the United States would require far more space than is available here; nonetheless, an attempt will be made to canvass the subject broadly and to touch briefly upon the significant points.

More and more we hear talk about, and read alarming reports of, the imminent failure of our ground-water resources. It has been reported that ground-water depletion is well along the way and that, with reports of declining water levels all over the country, it is only a matter of time until the

wells will all be dry. What is the actual situation? How much truth is there in these alarming reports? In the following paragraphs I shall attempt briefly to lay a foundation for, and arrive at a general answer to, these important questions. Before doing so, however, let us nail down one important fact. For the country as a whole there is no progressive decline of the water table. Where a decline has occurred, whether in a heavily pumped industrial or irrigated district or on an individual farm, there are definite, ascertainable reasons for it which can be identified by scientific investigation, and economically feasible solutions can be developed for nearly every such problem. Such a solution may range from large-scale redistribution of pumpage or development of a supplemental water supply, in the case of a heavily pumped district, to simple deepening of a farm

NOTE.—The author is geologist, ground water branch, water resources division, U. S. Geological Survey, Washington, D. C. This article is published by permission of the Director of the U. S. Geological Survey.

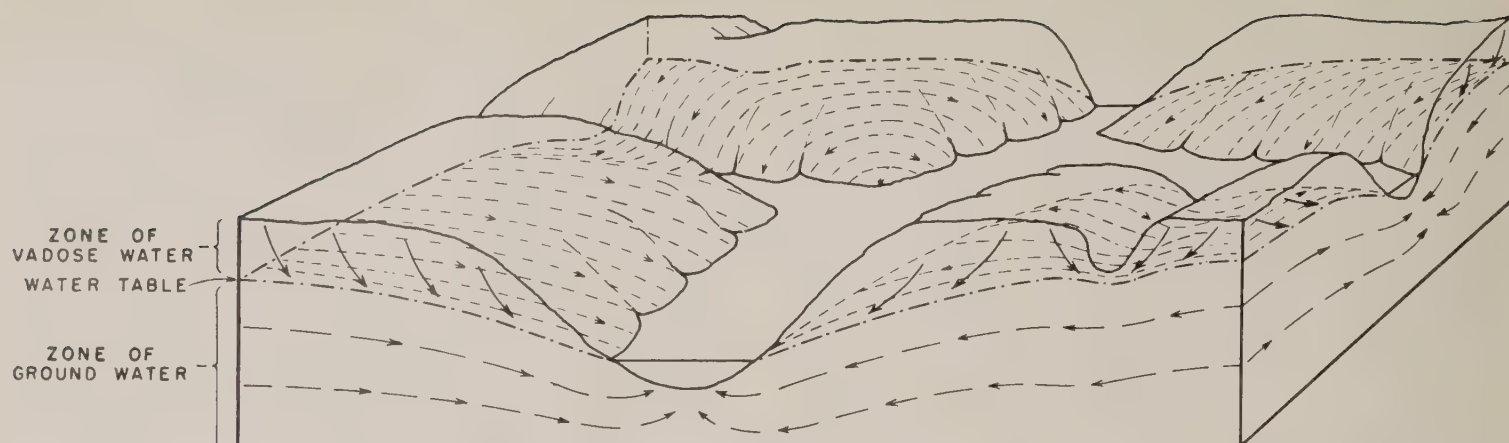


Figure 1. Idealized block diagram showing relation of water table to land surface. (Adapted after Longwell, Knopf and Flint, *Physical Geology*, John Wiley & Sons. By permission of publishers.)

well that was not deep enough initially to allow for the seasonal or dry-year lowering of the water table that is an integral part of the ground-water picture everywhere.

That we may properly understand the ground-water situation of the United States, it may be well to review briefly the occurrence of our ground-water resources.

The ultimate source of ground water is precipitation and, depending upon conditions of precipitation (intensity, areal distribution, etc.) and topography and geology, the ground-water resources are renewable—but only within limits, for in any given area the supply can be withdrawn more rapidly than it is replenished and thus can be depleted. Ground water is, in most places, constantly moving from higher to lower altitudes; it travels down gradient under pressure in artesian systems or by simple gravity flow under water-table conditions in nonartesian systems.

Figure 1 shows the way in which ground water typically occurs under water-table conditions. Figure 2 is a typical cross section in which a non-artesian aquifer (water-bearing formation) is underlain by a confined or artesian aquifer. Figure 3 shows an example of such conditions, at Fort Pierce, Fla., where both nonartesian and artesian aquifers are present, and where pumping the artesian wells lowers the artesian-pressure surface but does not affect the water table.

The range in ground-water conditions in the United States is as great as might be expected on the basis of the wide ranges in climate, topography, geology, permeability of rocks, and the extent to which the individual aquifers are exposed at the surface to recharge from precipitation or stream flow. Thus, we have areas of dry climate and rocks of low permeability where ground water is

very scarce, such as parts of the Dakotas and of the plateaus of Utah; areas having a humid climate but still having rocks of low permeability, such as parts of southern Illinois; areas of permeable and productive sediments but having a dry climate and a very low rate of recharge, such as the High Plains of Texas; areas having both permeable rocks and a wet climate and thus a very large ground-water supply, such as the Miami, Fla., area and certain glaciated areas in the Midwest and Pacific Northwest; there are all conceivable gradations among these conditions. Among the most productive ground-water regions are the Atlantic and Gulf Coastal Plains; the north central area of thick glacial deposits, especially Michigan and northern Indiana; parts of the northern High Plains in Nebraska; those alluvial basins in the West which are adjacent to high mountains that receive abundant precipitation; and parts of the glaciated and lava-rock areas of the Pacific Northwest. Among the least productive areas are the unglaciated parts of the midcontinent region extending from Kentucky and Tennessee to the eastern edge of the High Plains; parts of the northern Great Plains in the Dakotas and Montana, and the low mountains and high plateaus of the arid West.

All in all, the United States is blessed with enormous ground-water resources, though the geographic distribution is not so uniform as would be desirable, and it is this factor rather than an over-all shortage of water which is responsible for our water problems.

To determine the status of the Nation's ground-water resources, the United States Geological Survey at present maintains about 50 field offices and suboffices in various parts of the United States and, as part of the investigations, makes periodic water-

level measurements in more than 7,000 wells. These offices are usually set up through cooperative agreements with the States, or sometimes with smaller political subdivisions. Funds have never been adequate to make a complete, integrated, and continuing Nation-wide study of our ground-water resources; for that reason, and also owing to the nature of the Federal-State investigations, many of which are directed toward restricted though nonetheless important problems, comprehensive coverage of our Nation's ground-water supplies does not exist. No individual or organization has a quantitative answer to all the ground-water problems of this country.

However, this is not to say that little is known, or that we cannot make intelligent appraisals of our problems. As a result of the United States

Geological Survey investigations to date, approximately 2,000 technical and scientific reports have been published. These cover small to large areas, both generalized areal and detailed quantitative investigations, areas within the continental United States and the territories, methods of procedure, and many related subjects. New techniques of investigation are constantly being developed. Among those developed in recent years or being developed now are mathematical procedures for using the results of pumping tests on wells to predict the long-term availability of specific quantities of water under specified conditions of withdrawal; test-drilling techniques that yield the maximum information at the least cost; use of geophysical instruments to supplement test drilling; development of electrical-model and other

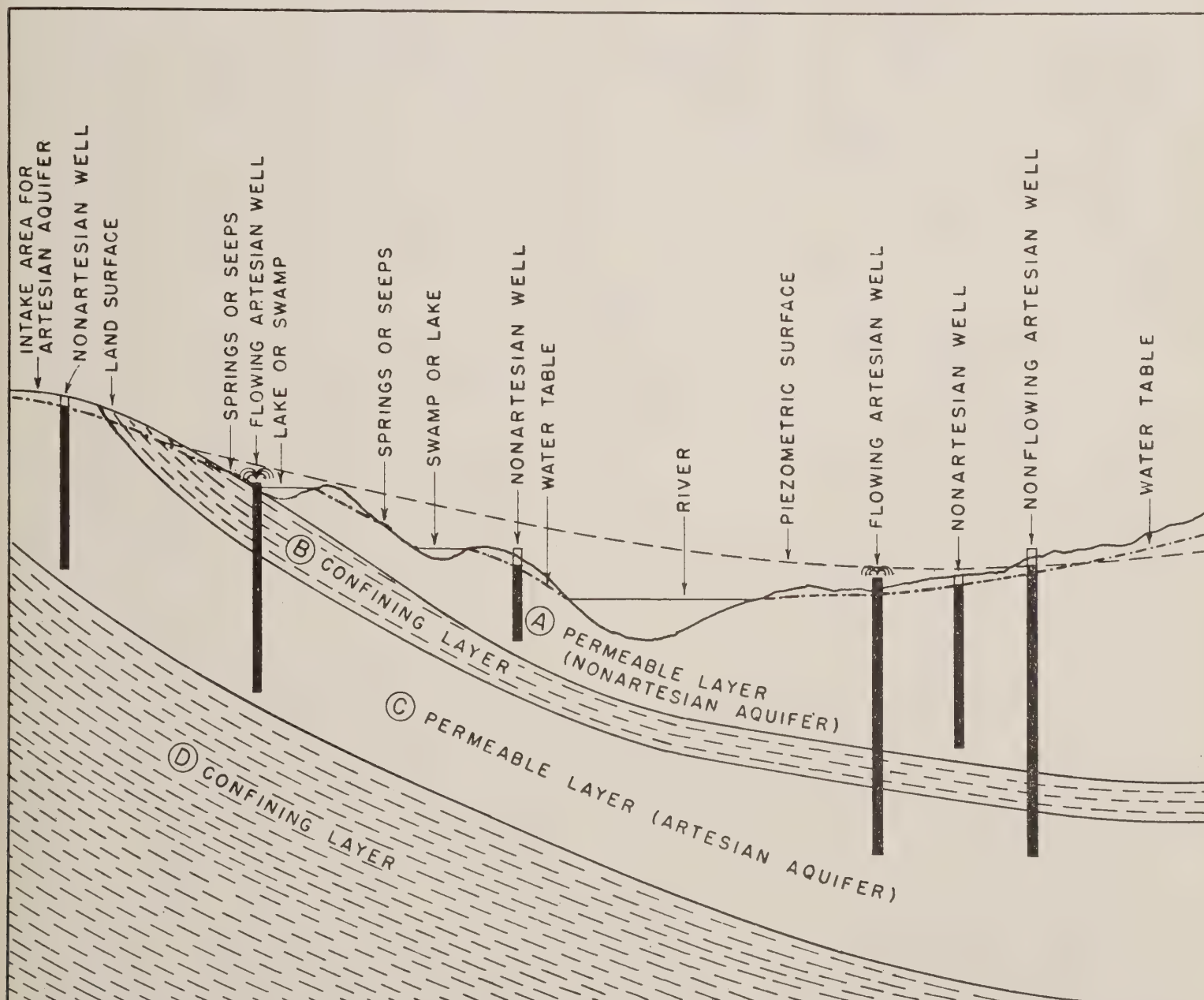


Figure 2. Idealized cross section showing relation between water table and piezometric surface of artesian water in an area with geologic structure similar to that of Kissimmee Valley, Fla.

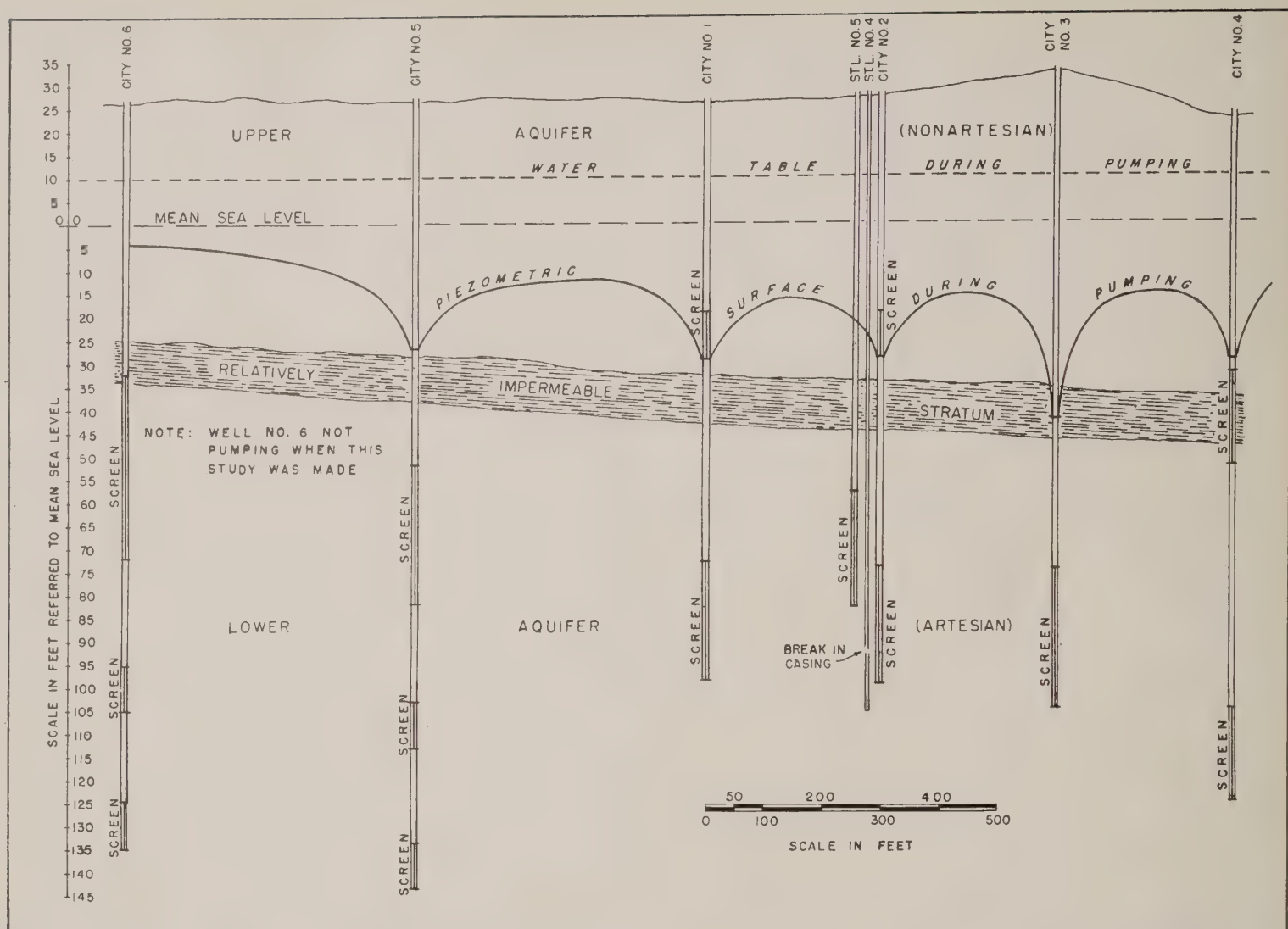


Figure 3. Generalized north-south cross section through Fort Pierce, Fla., municipal well field showing geologic formations and ground-water levels on June 6, 1944.

laboratory methods of studying problems too complex to be treated by mathematical analysis of pumping-test results; studies of the mechanics of unsaturated ground-water movement in relation to the occurrence and amount of natural recharge; and studies of the practicability of artificial recharge and of inducing infiltration from streams by pumping from nearby wells. All in all, we have a very substantial body of knowledge about our ground-water resources.

Figure 4 is a map of the United States showing areas of known heavy ground-water withdrawals; areas for which substantial ground-water data are available; areas in which quantitative studies have been made; and estimated pumpage by States in 1945. The map is not claimed to be absolutely accurate, for even such a term as "heavy ground-water pumpage" is not wholly objective. However, the map does serve a valuable purpose in that it indicates plainly areas lacking in study, and shows by comparison the relative importance of

ground-water development in the several States.

In many parts of the country, especially in the arid and semiarid West, surface-water supplies have been largely developed—in fact, in some cases overdeveloped. In these areas the remaining undeveloped ground water is the only source of new water supplies.

During the past 10 years, ground-water consumption in the United States had about doubled and is now in excess of 20 billion gallons daily. Assuming an average cost of production of 5 cents a thousand gallons (about \$16 per acre-foot), this amounts to more than a million dollars a day spent for ground water. Of the total of 20 billion gallons a day estimated for 1945, irrigation in the West accounted for 9 billion gallons a day and irrigation in Arkansas, Louisiana, and Florida for 1 billion gallons a day. Industrial use required 5 billion, municipal use (excluding industrial) 3 billion, and rural use 2 billion.

Irrigation with ground water is rapidly increasing, even in the humid East. In some areas, however, including such important ones as central Arizona, the southern High Plains of Texas, the Central Valley of California, and the West Basin near Los Angeles, serious ground-water short-

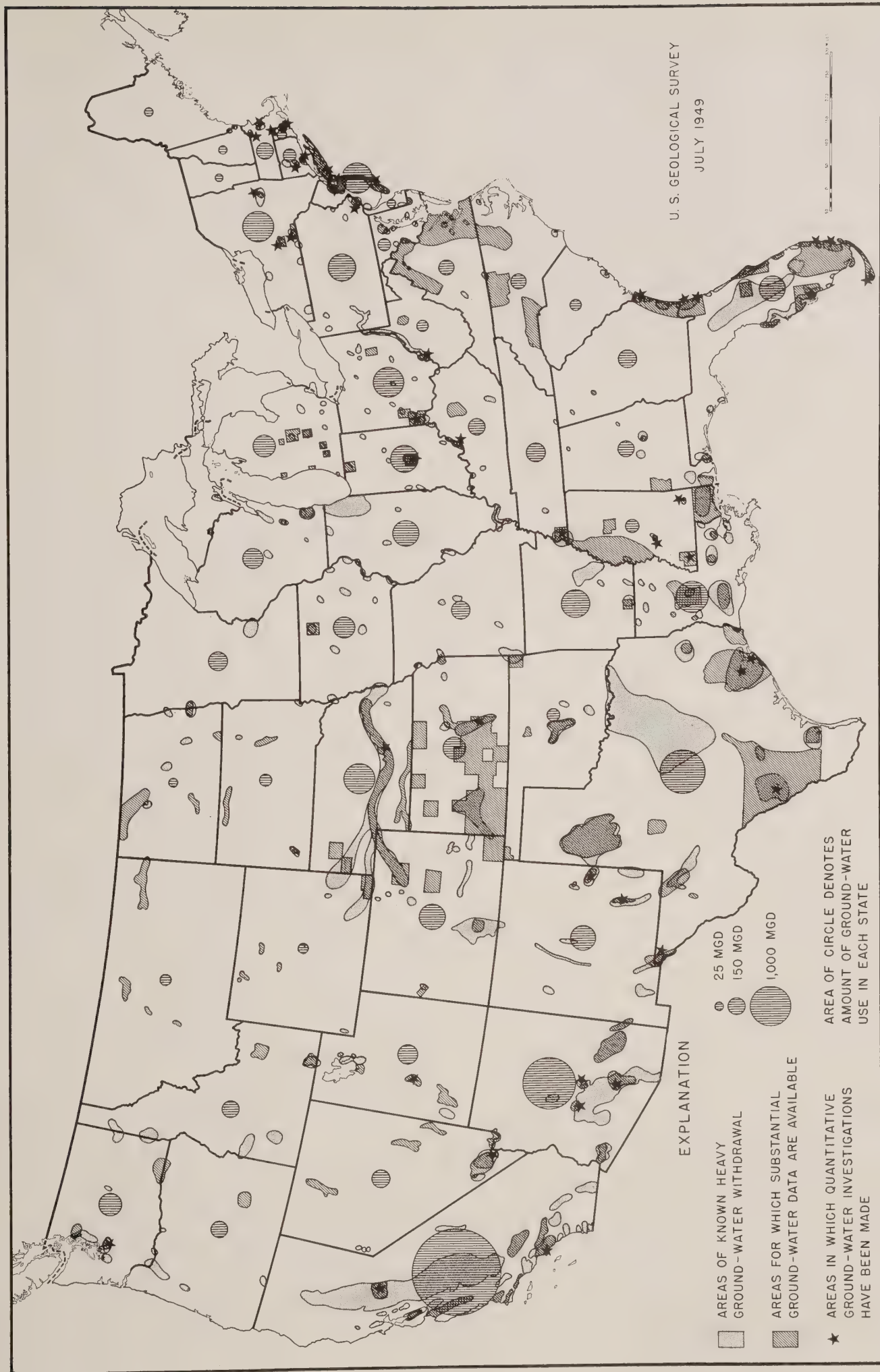


Figure 4. Map of the United States showing areas of known heavy ground-water withdrawal; areas for which substantial ground-water data are available; areas in which quantitative investigations have been made; estimated pumpage by States in 1945.

ages are presenting problems difficult to solve. In some areas, such as Arizona, where surface water formerly furnished essentially all irrigation supplies, ground water now is the chief source. Arizona, in 1945, used approximately 4 million acre-feet of water for crop irrigation. Of this, slightly more than 50 percent came from ground-water sources. In 1948 the total was about 4½ million and the ground-water percentage increased to about 70. Here, as in some other areas, pumpage exceeds the natural supply. This is indicated by continued decline of ground-water levels, amounting to an average of 8 feet in central Arizona during 1948 alone, on top of the decline in previous years. In certain local areas the decline in 1948 was as great as 21 feet; the Deer Valley area has shown a total decline since 1941 of more than 100 feet. And with this decline in level is a constantly increasing salt content in the ground water in the lower parts of some basins, resulting from lack of sufficient outflow to keep the salt flushed out.

Another area worthy of more than passing mention is the Texas High Plains south of Amarillo, where irrigation from wells has recently expanded at a faster rate than in any other area in the United States. In 1934 about 300 wells irrigated 16,000 acres, but by 1948 this had increased to 10,500 wells irrigating more than 1 million acres. The ground water comes from sands constituting an enormous ground-water storage reservoir which has a very low annual recharge. The water here is being "mined"—that is, removed at a rate many times the recharge, and it is but a question of time until the yield will drop off to uneconomic amounts as the water levels decline in ever-larger areas. The problem is not alone that of the hydrologist who determines the balance between input and outgo, and thus derives the "safe yield." It is also a problem for economists, businessmen, statesmen, and philosophers, who must decide how long the stored water should be made to last and the conditions of its withdrawal. Hitherto most legal concepts have been based on the assumption that withdrawal of ground water must be held within the limits of the perennial yield, but the High Plains case indicates that under certain conditions this principle may have to be modified.

Industrial and municipal use of water, especially during World War II, created numerous problems and much alarm. Miami, Fla., lost two well fields and thousands of privately owned wells to salt-water encroachment before it was determined that the cause was drainage canals which had so lowered coastal water levels as to induce sea-water encroachment because the balance between salt water and fresh water had been upset. Slight raising of the water table by control works in the tidal canals will solve the problem of salt-water encroachment in the Miami area. Louisville, Ky., during the war found its ground-water level receding at an alarming rate. Quantitative studies of the aquifer indicated the amount of pumping to be about 20 million gallons a day more than the recharge. Industries voluntarily effected many economies in ground-water pumping, and at two plants cold surface water was artificially recharged to the aquifer during the winter, then used during the summer when surface water was too warm. Through knowledge of the industrial needs, adequate study of the hydrology of the aquifer, and teamwork among the

users, the Louisville problem was solved, and the total withdrawal is now adjusted to the recharge.

Numerous other situations might be cited; however, these will suffice to show the nature of some of the problems and remedies. The main points to be stressed are, first, that many of our serious ground-water problems can be solved within economic limits through adequate hydrologic investigations involving all the techniques of a vigorously developing young science; and, second, that it is possible by means of adequate basic studies to prevent problems from arising, by pointing out the limitations of a supply early in the game, and it is cheaper to do so than to wait until a serious problem has arisen and then perhaps to find that a valuable aquifer has been irremediably despoiled.

In concluding, it may be stated briefly that, in general, there is no present danger of depleting the ground-water supplies of this Nation, except locally. And, even in local areas, much can be done to prevent disaster by intelligent use of the aquifers once their hydrologic characteristics are known. Over short periods of time ground-water reservoirs can be overdrawn without serious results. During times of unusually heavy precipitation above-average replenishment of the ground water will postpone the day of reckoning resulting from overdevelopment. But we would be shortsighted indeed if we failed to recognize that, to protect the heritage that rightfully belongs to the next generation, long-range solutions to these problems must be developed.

AN INFILTRATION STUDY

By GLENN K. RULE

COTTON hulls, or "gin trash," may not have much apparent relation to the water problems of California. Surprisingly, however, this waste material leads all others thus far tried as a surface treatment to hasten the taking up of water by the soil in a way that leads it on down into the underground reservoir.

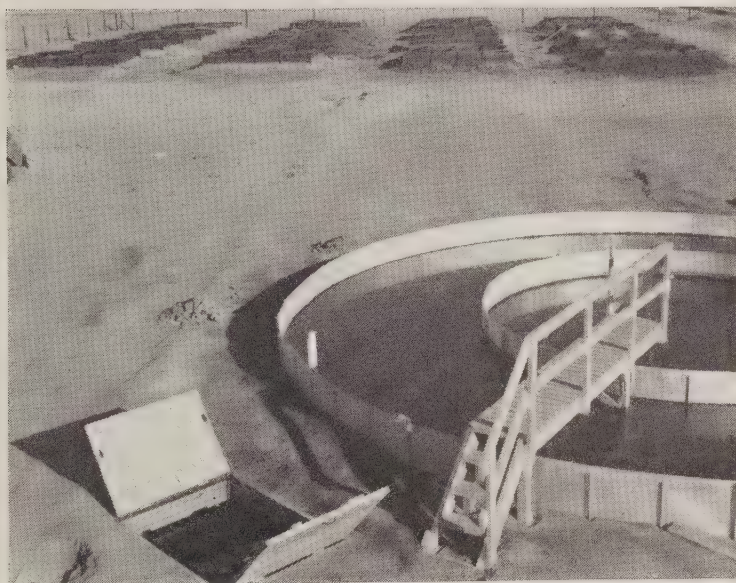
This is significant news to thousands of California farmers who are obliged to pump water at increasing expense from deeper and deeper depths as the level of the underground water supply drops with use. Research workers of the Soil Conservation Service have derived much encouragement from their discovery of this method of coaxing

NOTE.—The author, executive assistant to the chief of the Soil Conservation Service, based this article on data supplied by A. T. Mitchelson, State project supervisor, Division of Irrigation and Water Conservation, Soil Conservation Service, Berkeley, Calif.

large quantities of water into the underground strata to replace ground water removed by heavy pumping for irrigation.

While legal rights to water from stream flow provide some assurance of a water supply for those who own such rights, a far greater problem, in the larger perspective, relates to the increasing number of water users who depend on water pumped from failing underground sources. In some of the most adversely affected areas in the upper San Joaquin Valley, for example, the ground-water level is said to have dropped in places from around 50 to 200 feet between 1921 and 1939. I am told that this has caused the abandonment of nearly 50,000 acres of once highly productive land.

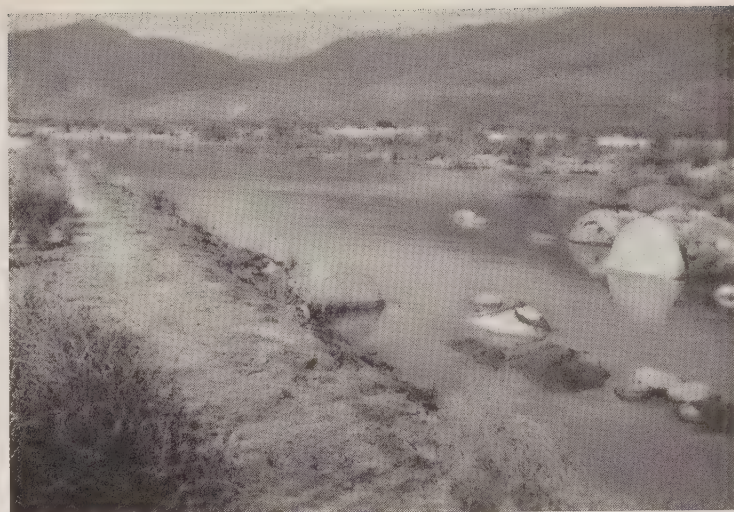
According to local information, when farmers began sinking wells near Wasco about 1910, it was not unusual for them to reach water at depths of 20 to 25 feet. Now, by contrast, most of them are



Background—settling or infiltration basins at Wasco, Calif. Soil in each is treated with an agricultural waste such as cotton hulls, corn stalks, or straw. Water is measured into each tank, object being to determine which treatment gives best infiltration rate. **Foreground**—apparatus used to check on horizontal movement of water.

obliged to lift water around 125 feet or more. Obviously, this means that more water is coming out of these natural underground storage reservoirs than is going into them.

This situation causes farmers and landowners to cast envious eyes on excess flood water that annually runs to the sea as waste. This raises the question: Can such waste water be spread over the land and induced to enter the underground storage spaces fast enough to raise the water table or, at least, to prevent it from dropping still farther?



Water spreading on detrital cone of Upper Santa Ana River, San Bernardino County, Calif. Earth-rock dams are formed on slopes just high enough to back water to downstream toe of next higher dam, thus increasing wetted area.

Of course, there are no quick answers to this question. Much has been learned but far more needs to be known. First of all, the farmer must be assured that there is a satisfactory underground reservoir of water available and suitable for pumping and that the reservoir can be recharged by water spreading.

Much of our knowledge with respect to underground storage is based on experience with coarse-textured soils. One of the first recorded attempts to spread water for underground recharge was made near Denver, Colo., on the outwash soil of Cherry Creek, in 1889, by the Denver Union Water Co. Later, water was again successfully saved by spreading it on the detrital cone of Santiago Creek in southern California. A little later the same practice was successfully used near the mouth of the Santa Ana River. These later projects have since been enlarged and improved and the general practice of water spreading in much of southern California stems from these early trials.

Still later, research work was started on the detrital cone of the San Gabriel River in Los Angeles County. But in the '30's, as earlier, water engineers did not fully sense the wide difference in soils with respect to the amount of water they could take up. As a consequence, this study was concentrated on several other factors which, though related and important, did not throw adequate light on the problem of storing water in the ground under diversified soil and topographic conditions. Meanwhile, irrigation and other pumps

(Continued on page 65)

FIGHTING FLOODS AT THEIR SOURCE

By L. G. SIGNELL

WHAT is done with the water? What happens to the land? The answers to these questions are an index to the success of watershed methods of flood control.

Here, upstream, along the tiny tributaries, spread out on valley slopes, is the logical beginning of the comprehensive soil conservation plan to minimize the hazards of destructive waters. The program is not simple. Many people, many organizations, many government agencies are concerned. There is a wide variety of courses of action from which to choose.

Accordingly, any review of flood-control accomplishments needs to take into account the sometimes seemingly unproductive but nonetheless essential steps leading to the installation, operation, and maintenance of specific measures on the watersheds.

A progress report is expected to summarize principal accomplishments in terms of measurable units of work. The change in aspect and extent of SCS activities in flood control since World War II contrasted to those before the war, however, have been so pronounced that this report might well relate the developments of the past 3 years to those of the prior period. Also, it seems desirable to recount the evolution that has taken place in the matter of concept.

In 1936 investigations were begun. By World War II, survey reports had been completed on 11 watersheds. These reports recommended works of improvement and were transmitted to Congress. Seven of them at that time found insufficient benefits to justify federal participation in watershed treatment under the flood-control authority. Surveys were in various stages of completion on some 32 other watersheds when the war necessitated suspension of the work. In addition, the preliminary examination had been made of 124 watersheds in which sufficient flood damages were apparent to warrant recommending the more complete analysis accorded by surveys.

This early period, as would be expected, was given over to learning what this new arm of the Service was to do. Top technicians were assigned to develop techniques for evaluating flood damages, and for tracing the origin of these damages. Methods were formulated for appraising the physical benefits of measures proposed for retardation of runoff and waterflow and for soil erosion prevention at the source to reduce flood damages. Ways were worked out to estimate costs of installing and maintaining practices, as related to the expected monetary and other benefits. Since federal assistance to carry out flood-control operations was to be determined in the Congress on a watershed basis, each report received close scrutiny by committees in the

NOTE.—The author is soil conservationist, water conservation division. Soil Conservation Service, Washington, D. C.





MAP - PURISIMA AND CEBADA SUB-WATERSHEDS

Service and jointly with representatives of participating bureaus in the Department of Agriculture. They were also reviewed by the States, the Army Corps of Engineers, the Bureau of Reclamation, and other interested agencies.

Out of this sorting period came completed survey reports for 11 watersheds in which the recommended works of improvement were authorized by Congress for federal participation in application. It yielded experiences and procedures invaluable when surveys were resumed in fiscal year 1946.

Although the war was still going on when the 1944 Flood Control Act was passed, Congress provided (in sec. 13) "that the necessary plans and preliminary work may be prosecuted during the war with funds from appropriations heretofore or hereafter made for such works so as to be ready for rapid inauguration of postwar construction," and "that when the existing critical situation with respect to materials, equipment and manpower no longer exists and in any event not later than immediately following the cessation of hostilities in the present war, the projects herein¹ shall be initiated as expeditiously and prosecuted as vigorously as may be consistent with budgetary requirements."

The Department of Agriculture had a long way to go to fulfill this directive. The estimated cost of federal participation in the 11 watersheds totaled nearly \$90,000,000 (prewar prices). The works of improvement were recommended in the survey reports to be installed over periods ranging from 10 to 24 years depending on the kind of measures proposed in the respective watersheds and the expected rate with which local cooperation would materialize.

Where to begin, what to install, who would participate on specific jobs, what rate should be scheduled for the different types of work and how the entire activity would be tied together to achieve the flood-control purposes were all key questions which needed to be worked out before a logical basis could be established for requesting allotment of funds and for carrying out operations.

An early decision was to go after results; therefore, operations would be concentrated on retard-

ing runoff and waterflow in selected subwatersheds. Erosion-prevention measures would aim at reducing flood water and sediment damages. There were no illusions as to the difficulty of this task; it involved the cooperation of hundreds of landowners and operators. It dealt with the installation of many and interrelated conservation practices and flood-control measures with both vegetative and mechanical means to be utilized fully.

An allotment was made in fiscal year 1946, from reserve funds, to make "necessary plans and preliminary work." Governing bodies of soil conservation districts provided local leadership. District supervisors usually saw to it that the subwatershed flood-control work plan was incorporated in the district work plan—the logical chart for showing what is to be done, where, by whom, how and when, at what rate, and at what cost.

To get started on the right foot, to get or keep in step with the march of events, required recognition of the direction being followed in the development of major works by other departments for flood control, drainage, irrigation, water power and allied purposes, as well as the trend of operations in the soil conservation movement.

A grass-roots leader, member of a State soil conservation committee, recently reiterated the principle "a river and its tributaries constitute a unit, one living organism; you cannot affect any part of it in a substantial way without affecting all of it; you cannot control and develop it for any particular function without affecting the potentials of the other functions."

Since this concept was first stated some 15 years ago, it has enjoyed such popular acceptance that programs comprising major structural works for flood control, navigation, irrigation, land reclamation, and power have been planned on the broadest possible basis. The programs cover such river-basin systems as the Missouri, Ohio, Rio Grande, Central Valley (Calif.), and Columbia.

A good example is the Pick-Sloan plan for the Missouri Basin, in which are related the development schemes of two of the principal construction arms of the Federal Government.

A further milestone is the agreement of December 29, 1943, of the Federal Inter-Agency River Basin Committee, which provides for mutual consideration, exchange of information, and correlation of programs by the member agencies.

¹ Buffalo Creek Watershed, N. Y.; Potomac River Watershed, Va., W. Va., Md., and Pa.; Little Tallahatchie River Watershed, Miss.; Yazoo River Watershed, Miss.; Coosa River Watershed, Ga., Tenn.; Little Sioux River Watershed, Iowa; Middle Colorado River Watershed, Tex.; Trinity River Watershed, Tex.; Washita River Watershed, Okla., and Tex.; Santa Ynez River Watershed, Calif.; and Los Angeles River Watershed, Calif.

[illegible]

AUTHORIZED FOR WORKS OF IMPROVEMENT AND REVIEW OF SURVEY UNDER WAY

There followed soon the formation of the Missouri Basin Inter-Agency Committee and the Columbia Basin Inter-Agency Committee to follow through in more detail the proposals for development of the resources of the respective basins.

As these basin committees got into their work, it soon became evident that an essential element was lacking. The large impounding reservoirs, floodways, navigation channels, irrigation and drainage canals were destined to function with ever-diminishing effectiveness as sediments washed in from watershed lands and tributaries.

The triple threat of land impoverishment from erosion, flood damage from frequent overflow of

tributary valleys, and sedimentation in downstream works needed to be tackled on a comparable basis with the major works just referred to, in order that the whole scheme of improvements return the maximum continuous benefits. Accordingly, the watershed or subwatershed approach has taken on new and enlarged meaning.

As many will recall, the early Soil Conservation Service demonstrations were on a watershed basis. Launching of the Nation-wide conservation program began with the advent of locally organized soil conservation districts. Of necessity, this caused a temporary departure, generally speaking, from the watershed concept in furnishing technical assistance, since the districts were formed here and there as localities became ready.

Now that more than three-fourths of all farm and

WORKS OF IMPROVEMENT

Some of the principal accomplishments, as of December 31, 1948, are:

1. Small upstream floodwater-retarding reservoirs—306 for detention of 150,248 acre-feet planned; 13 completed for 2,450 acre-feet.
2. Debris basins.—1,417 planned; 285 completed.
3. Revegetation.—Grasses and legumes, 296,956 acres planned, 40,502 acres completed. Woody plantings, 34,576 acres planned; 1,213 acres completed. These figures include critical slopes and silt source areas where vegetative cover provides watershed protection.
4. Minor waterways.—80.48 miles planned; 15.93 miles completed.
5. Tributary channel stabilization.—257.6 miles planned; 5.5 miles completed.
6. Diversions.—200.3 miles planned; 31.0 miles completed.
7. Gully control.—11,534 acres planned; 260 acres completed.
8. Roadside erosion control.—914.5 miles planned; 17.2 miles completed.
9. Structures.—1,299 planned; 436 completed.

SURVEYS

As of July 1, 1949, status of watershed surveys, for which the Soil Conservation Service is responsible for report preparation, was as follows:

Reports transmitted by Chief, Soil Conservation Service, (concurred in by Chief, Forest Service) to Secretary of Agriculture:

Date transmitted to Secretary

Pee Dee, N. C., S. C., Va. January 5, 1949
Sny, Ill. January 17, 1949
Queen Creek, Ariz. February 2, 1949

Date transmitted to Secretary

Missouri, Mo., Iowa, Minn., Kans.,
Nebr., S. Dak., N. Dak., Mont., Wyo.,
and Colo. March 25, 1949
Grand (Neosho), Ark., Kans., Mo.,
and Okla. March 30, 1949
Little, Tex. April 12, 1949
Pecos, N. Mex., Tex. June 3, 1949

Field work completed, drafts of reports being reviewed by interested local groups, State and Federal agencies:

Arkansas, Lower, Ark., Okla.
Walla Walla, Wash., Ore.
Whitewater, Minn.
Root, Minn.
Youghiogheny, Pa., Md., W. Va.
Galena, Wis., Ill.
Bosque, Tex.
Roanoke, Va., N. C.
Scioto, Ohio
East Fork of White and Patoka, Ind.
Sangamon, Ill.
Gila, Upper, Ariz., N. Mex.
Salt Fork, Okla., Kans.

Field work under way

Lehigh, Pa.
Savannah, S. C., N. C.
Green, Ky., Tenn.
Apalachicola, Fla., Ala., Ga.
Mississippi (above Cairo, Ill.,) Ill., Mo., Iowa, Wis.,
Mich., Minn.
Red, Tex., Okla., Ark., La., N. Mex.
Rio Grande, N. Mex., Tex.
Salinas, Calif.
Russian, Calif.
Moses Coulee, Wash.
Willow Creek, Ore.
Brazos, Tex. (except Bosque and Little).

ranch lands in the United States are included within the boundaries of soil conservation districts, it is practicable to proceed again with the furnishing of technical and other federal assistance on a basin, watershed, or sub-watershed basis. Experience in flood-control operations in the past 3 years has borne this out. Planning for flood-control conservation operations has been done on some 450 minor watersheds comprising more than 4,000,000 acres in the 11 authorized watersheds. The soil conservation districts (and in the Los Angeles watershed, the Los Angeles County Flood Control District also) have joined wholeheartedly in minor-watershed planning, even more so than might have been expected in the short time that has elapsed since the Guide for Flood Control Operations was issued in May 1946. The principles set forth in that memorandum have proved to be practical in application; supplemental memoranda of understanding covering the flood-control activities have been entered into by the soil conservation districts concerned and the flood-control work plans incorporated in the district work plans.

With this article is a photograph of the Purisima and Cebada subwatersheds of the Santa Ynez River watershed showing land treatment and location of water management measures included in the work plan. The plans for this area were worked out in detail with the directors of the Lompoc Soil Conservation District, and the sub-watershed group of landowners and operators. A schedule for order of establishment, the amount of participation, and the responsibilities of each party for installation, operation, and maintenance was agreed upon before funds for the works of improvement were requested.

Measures are being applied in each of the 11 authorized watersheds in accordance with the carefully devised work plans. Provisions are made in the flood-control conservation farm (or ranch) plans for the measures to be applied by the landowner-operator with the flood-control assistance made available to the district. Contracts are let for such works as are beyond the capacity of individual land operators to install. As of July 1, 1949, contracts had been let as follows:

Trinity-----	\$22, 476. 00
Washita-----	274, 522. 85
Little Sioux-----	708, 707. 21
Los Angeles-----	346, 278. 99

These contracts cover improvements such as small up-stream floodwater-retarding reservoirs, debris basins, stream-bank protection, and other works to stabilize and improve capacity of waterways and channels to carry flood runoff.

It would be presumptuous to make predictions for next year or thereafter. Possibly the best idea of the future may be obtained from the trend in the scope of surveys, reports of which are prepared for submittal to Congress and upon which authorization for operations is based.

It has been found that the cost per square mile of making flood-control investigations varies inversely as the size of watershed or basin. The cost per unit area of the larger watershed or basin surveys is but a fraction of the cost, proportionately, of that of the small watersheds. The shift to basin-wide surveys, such as the Upper Mississippi, Rio Grande, Red, and so on, is

one of the significant developments in flood-control procedures. The saving in time, speeding the processes which lead to authorization of watershed treatment, is of equal or greater importance than the large initial saving in cost of investigations. Further, it provides a common denominator for correlating improvement programs of the Department of Agriculture, Department of the Army, Department of the Interior, and other Federal and State agencies.

Through this approach it can be expected that a more thorough, economic, and beneficial development will be made of basin resources.

AN INFILTRATION STUDY

(Continued from page 59)

in increasing numbers have been at work lifting water from underground reservoirs in many parts of the State. A recent count in the San Joaquin Valley indicates that perhaps as many as 40,000 pumps are in use in that locality to lift water for irrigation, domestic, and industrial uses. In three counties of this area (Kern, Madera, and Tulare) there are about 1,500,000 acres of irrigable land for which there is insufficient water to meet present requirements.

Such facts add interest and importance to the potential use of water that soon may be available for distribution from the Friant Dam, one of the key features in the development of the great Central Valley Project by the Bureau of Reclamation. This dam was built to store and divert water to the Madera and Friant-Kern Canals. Present plans call for the transportation by the Friant-Kern Canal, alone, of over 1 million acre-feet of water each year. About one-half of this supply will be used as Class 1 water; meaning that it is stored and available for immediate irrigation use. The other half will be principally present waste water, much of which, it is hoped, can be diverted for recharge of receding ground-water supplies.

The word "hoped" is used advisedly. The problem of using this potential water economically and efficiently has furrowed the brows of many farmers and technicians who have considered and worked on the problem.

Recent experiments, until this one near Bakersfield, were none too promising. The North Kern Water Storage District, in an experiment started in 1936 in Kern County, found that percolation rates of water applied continuously on undisturbed soils declined after a few weeks below the point of practicability. Literature of the time showed that considerable work was under way on

infiltration, but most of it was related to the infiltration of rainfall or irrigation water to the root zone of plants. It means that water was applied for relatively short periods of time—entirely too short for the recharge of deep underground aquifers.

If you drive about 24 miles northwest of Bakersfield you will find two sets of ponds which represent the most recent attempts to solve the riddle of how to get more water underground, and without using all the land as a settling basin. Work at these settling ponds or basins, one near Wasco and the other near Minter Field, represents the cooperative effort of the Soil Conservation Service, the Bureau of Reclamation, the State Division of Water Resources, and Kern County Land Company to come up with a satisfactory solution. While these structures are called ponds or basins, they really are simply wood structures, each enclosing an area of one-hundredth of an acre. Each basin is treated differently from the others, except that a known quantity of water is applied to each. The soil in each pond is treated with some agricultural waste material such as corn stalks, straw, cotton boll hulls; or it may be seeded to one or more of the adaptable pasture grasses.

Water for the Minter group first came from the Kern River by an irrigation canal, but since operations had to be discontinued each year when canal water was not available, the basins are now served by a well drilled in 1948. The basins at Wasco have always been supplied by water pumped from wells. Both groups are now supplied and operated continuously during the same periods of time.

The most beneficial treatment so far, as already indicated, has been through the use of cotton gin trash, either disked in or allowed to float until it sinks. The beneficial effect is not immediate but requires an ageing period during which the gin trash or waste decomposes in some degree. Usually the highest percolation rates are obtained after a drying-out period of the soil, following the initial period of ageing of the applied material. Peak rates as high as 14 feet per acre per day, or 3 to 4 times those obtained on undisturbed or untreated soils, have been reached. We don't know how long one application will be beneficial, but one treated basin still shows highly beneficial results 3½ years after the application.

Other treatments than this gin waste show results of varying degrees—some negative—but because the gin trash is a waste product in the San Joaquin Valley and the results from its use are so promising, the work there has been concentrated on this treatment.

Technicians working in soils and bacteriological laboratories of SCS have not definitely determined the reasons for the increased percolation rates brought about by the

use of gin trash, nor has it been determined what quantity should be applied to a given area to obtain the greatest benefit. To date, applications have been rather liberal. While gin trash is free at present, hauling and applying are fairly expensive. Field work is now going on in an attempt to determine the least amount of trash necessary to obtain the most economical benefit, and also to determine whether other materials will provide results equally beneficial.

Eventually, discovery of the reason why gin trash is so effective may open the way to the use of materials as yet not considered. Meanwhile, promotion of vegetative growth on the soil surface of the ponds has produced the next best results, but such growth has been much below the gin material in effectiveness.

While it may be too early to draw final conclusions, this much seems certain—and it is very significant—that the percolation rates obtained from soils under natural condition and not underlain by hardpan or other interfering strata can be largely increased by treatment as indicated above.

Water engineers are making no claims as to the percentage of waste water that can be usefully stored underground, but it looks very much as if this infiltration work is of great promise. This single discovery may result in savings valued at many millions of dollars annually.

SPREADING WATER FOR RECHARGE

By A. T. MITCHELSON

IT HAS been only within the last 20 years that this country and to a large extent certain other countries of the world have become soil-conscious and have awakened to the necessity of soil conservation. In the meantime great damage has been done to large areas of our most fertile agricultural lands by misuse and consequent water- and wind-erosion. Today our Nation is carrying on a comprehensive campaign of conservation of soils which seeks to make them more stable and more productive.

However, unlike the broad, nationally accepted campaign of soil conservation, there is no concerted plan for water conservation, although soil and water are the major elements of life. All activities of man are dependent on the combination and proper use of these two elements. In the past some conservation of surface water has been practiced throughout all our States by the creation of

NOTE.—The author is State project supervisor, Division of Irrigation and Water Conservation, Soil Conservation Service, Berkeley, Calif.



Aerial view of San Antonio Creek debris cone. Here is almost a complete story of water conservation by underground storage. In foreground are dams or dikes built to retard and spread water as it comes from canyon; in upper center is shown the stream bed and at top is the snowbank which feeds the stream.

storage reservoirs, but only for such specific purposes as municipal and industrial use or for the development of hydroelectric power. Again, only within the past decade have we realized that Nation-wide conservation of water is an essential feature in the orderly maintenance of the national economy. In the western or semiarid section of the United States we have been perhaps a little more daringly progressive in the development of water conservation programs. Here we consider all our projects as multipurpose enterprises, including in many cases, municipal, domestic, industrial, power, recreation, flood control, and even navigation. It is notable that in all the above we have discussed *surface* water conservation. There

is to date no concerted program of conservation or maintenance of ground-water supplies—certainly not as a national program. Only in limited areas of our irrigated sections have some worthwhile efforts been made to replenish and conserve these underground supplies.

The problem common to all areas of the West is the depletion of ground-water supplies. This is particularly true in California. Utilization of ground water for irrigation in California prior to 1880 was unimportant, with the exception of Los Angeles and San Bernardino Counties where nearly 1,000 artesian wells had been developed. Today the artesian flow has ceased and in practically every one of the south coastal basins of the State the water table has been falling progressively. This is because there have been five successive years of subnormal precipitation, during which period there has been tremendous increase in irrigation demand. Ground-water uses in this area are greater than surface supplies, even though the latter include importations from the Colorado River, the Owens Valley, and the Mono Basin. Los Angeles County has for many years been the leading county in the United States in income from agricultural production, which is largely supported by irrigation from ground water. In Santa Barbara County nearly all the 60,000 acres of irrigated lands are served exclusively from ground supplies. The same is true in San Luis Obispo County, Ventura County, Mojave Valley, and Coachella Valley. In the central coastal area approximately 127,000 acres in Salinas Valley, 30,000 acres in San Benito Valley, 17,000 acres in Pajaro Valley, 130,000 acres in Santa Clara Valley, and 10,000 acres in Livermore Valley are all exclusively served from ground-water resources.

North of the Tehachapi range in the San Joaquin Valley, considered the most productive valley in the country, there are some 40,000 irrigation wells delivering water to about 2 million acres of land. Most of these wells have been sunk in the past 20 years at a cost of approximately \$168,000,000. The underground water supply of this valley is being overdrawn by more than 1 million acre-feet each year and the water tables are dropping alarmingly. State authorities warn that the present overdraft of underground water is far beyond any normal amount of replenishment.

These are examples of the use and importance of ground water and its depletion in one State

alone. Reports of the United States Geological Survey indicate that the ground-water basins of Eastern, Midwestern, and Southern States are also being heavily drawn upon and are consequently being depleted.

So far we have discussed the ground-water supplies and the alarming extent at which they have been and are still being overdrawn. When a given ground-water basin has been depleted, replenishment is frequently slow. Recharge may be accomplished either by natural or by artificial means.

In the humid regions recharge generally occurs naturally and more regularly, owing to more abundant precipitation. In the western or arid regions where we have cycles of deficient precipitation, replenishment is much slower, because during these dry periods it is necessary to supplement a scant surface-water supply by increased draft on ground water to irrigate crops and satisfy domestic and industrial demands.

Fortunately, however, nature has balanced this disadvantage by providing the greater portions of the arid West with aquifers susceptible of both artificial and natural recharge. Water-bearing formations differ greatly in their capacity to transmit water and in the quantity they will yield from storage. There are, generally speaking, two distinct classes of aquifers—those with low rates of recharge and where heavy withdrawals are mostly from storage; and those with high rates of recharge, transmission, and discharge, which are therefore capable of furnishing large perennial supplies. In this article we are interested in the latter class.

Deep underground aquifers are replenished naturally by precipitation falling directly on the valley floor, by seepage from streams traversing the valleys, and, in our western country, by return water from irrigation. Good examples of natural recharge are the Mimbres Valley, N. Mex., replenished primarily by the Mimbres River; the Platte River Valley, Nebr., replenished by water of the Platte River; and the Salinas River Valley, Calif., recharged by the Salinas River. All these cases are in areas where the valley floors are underlain with deposits of gravels and sands permitting both rapid recharge and copious withdrawals, yet coming back to normal or near normal levels at the close of seasons of precipitation.

On the border line between natural recharge, or where natural recharge is aided or stimulated by artificial means, there is the case of the Madera Ir-

rigation District, Calif., where off-season water is released from Friant Reservoir (Millerton Lake) on the San Joaquin River, to the Madera Canal of the Central Valley Project and distributed to the channels of the Fresno River and several creeks and sloughs. Flowing down the porous beds of these natural channels the released water percolates to the ground water, resulting in the maintenance of high ground-water levels although there may be pumping during the period of recharge. In this case, just enough water is released from storage to satisfy the absorptive capacity of the wetted areas.

In purely artificial recharge, the term "water spreading" is used, but this practice should not be confused with the same term when used to describe diversion of water from flood channels for the purpose of irrigating crops, forage lands, and pastures. In one case small volumes of water are applied for relatively short periods of time in order to supply adequate moisture to soils within the root zone of plants. Water spreading as we practice it in the arid zones is the application of large volumes of water over areas of porous surfaces as large as can be utilized, and holding the supply on the land as long as there is available water or as long as satisfactory percolation continues. It means diverting flood waters, or other waters which might be otherwise wasted, to deep underground aquifers for future use. This may seem to be a simple procedure, but conditions encountered in most areas where spreading is needed are complex. First, the soil surface must be porous, permitting rapid entry of the water to the successive underlying soil strata, and there should be assurance that descending soil profiles will permit rapid percolation to the place of storage. These requirements are met on the debris cones of streams of southern California, where waters rushing down the steep canyon slopes dropped their bed loads of boulders, gravel, and sand as they met the flatter slopes of the valleys. As the velocity of the streams decreased, they dropped the heavier and then the lighter materials. This gradation of coarse and finer outwash built up ideal spreading areas.

The underground reservoirs or basins are really valleys filled with recent alluvial materials. One major basin, embracing Los Angeles, Orange, and parts of San Bernardino and Riverside Counties, has a surface area of 840,000 acres and consists of 37 rather distinct deep underground aquifers. They furnish the ground-water supply for practically all the area referred to. Satisfactory surface reservoir sites in southern California are few because of the steepness of the canyons, resulting in prohibitive cost per acre-foot of storage.

While spreading water for storage underground started on a small scale in Colorado as long ago as 1889, modern spreading was first practiced in southern California in what is known as the South Coastal Basin, because there the conditions were suitable and the need for water was great. From very crude headworks or diversion structures and temporary distribution systems, the practice of spreading has become an important part of the over-all conservation program of that region, with modern structures.



Cross walls on upper portion of Cucamonga Creek spreading grounds. The walls are of wire-bound rock construction. They form basins intended to settle out debris and also spread water over floor of canyon.

About 10 years ago some minor-scale water spreading was successfully attempted in the East. The city of East Orange, N. J., carried out a spreading program by diverting water from a brook to and over about 11 or 12 acres of absorptive land. Measurements of the flow indicated absorption of more than 3 cubic feet of water per second, or a recharge of over 2 million gallons per day. Flooding has been successfully used to recharge ground-water supplies in Arizona and also in New Mexico, and experimental spreading has been successful in Utah.

There are four general methods of spreading: (1) the basin method; (2) the furrow or ditch method; (3) the flooding method; and (4) the use of pits, shafts, or wells. The method adopted is governed by the topography of the soil surface, the general slope of the spreading area, the amount of land available, and the character of the water with respect to silt content. Some spreading systems combine two or all of these methods.

In the basin method of spreading, the water is impounded in one or a series of basins formed by dikes or banks. The basins are so arranged that the entire area between basins may be submerged during spreading operations. The dikes often follow contour lines and are provided with outflow points so that excess water in the basin highest in elevation will escape into the next lower basin. This method is generally employed where the spreading surface is irregular or where depressions or ridges occur. It is not recommended where the water for spreading contains silt or other material which will tend to seal off the previous surface of the basin.

For the furrow or ditch method of spreading, water is run at low velocity through the furrow in a manner some-

what similar to furrow irrigation. Usually the furrows or ditches are shallow with flat bottoms and are spaced close together so as to expose the maximum percolation area. The grades should be relatively light, yet steep enough to provide sufficient velocity for the water to carry silt or fines in suspension, thus preventing deposition in the ditch bed.

In the flooding method, just enough water is spread over the surface to assure complete coverage, but at a very low velocity. Experiments carried on by the Division of Irrigation over a 4-year period proved flooding to be the most efficient method. In this way the soil remains in an undisturbed state and vegetative growth, which stimulates percolation and prevents erosion, is promoted.

The fourth method of recharge—that is the pit, shaft, or well method—does not actually follow in the category of spreading but is a means of delivering water to deep underground aquifers. It is the most direct method, but also the most inefficient and costly. It is not looked upon with favor by health officers, who contend that in direct delivery of surface water of questionable quality to ground-water supplies, without filtration or other accepted treatment, an entire ground-water basin may become polluted. Several attempts have been made to utilize wells for conveying water to underground storage, reversing the purpose for which they were originally intended, but the practice has not been successful. In the process of raising water to the surface, any fines loosened in the vicinity of the perforations of the casing are drawn into it and are either carried to the surface by the pump or are settled to the bottom of the well. It is notable that practically all wells continue indefinitely to discharge some sand and fines. If the flow is reversed and the well

used for recharge purposes, the fines in the water being delivered to the well and the fines in the water-bearing material of the aquifer are forced into interstices of the material surrounding the well, thus rendering it less efficient in fulfilling its original purpose. The city of Los Angeles, in efforts to recharge some of its ground-water basins several years ago, experimented with wells and abandoned the practice.

Shafts were also experimented with but found to be too costly and quite inefficient. However, recharge by use of wells has been successfully employed in some areas of the East. In certain areas in the vicinity of New York and in the State of New Jersey minor replenishing operations have been successfully carried out by utilizing diffusion wells as a recharge medium. Presumably this method is used because of the absence of adequate spreading lands.

Furthermore, even when land is available, it is not always possible to convey water readily to underground storage without considerable research into ways and means of preparing the surface soils in order to promote infiltration. In the central coast and central valley soils of California, where water spreading is necessary to replenish the depleted underground water supply, there are more consolidated soil types—claypans and hardpans—and even adverse economic conditions to contend with. As an example, there is the San Joaquin Valley where it

is inescapably necessary to spread water imported from Central Valley Project or other reservoirs to relieve the ground-water conditions described earlier in this article. The Friant-Kern Canal of the great Central Valley Project will convey water from Millertown Reservoir to irrigable lands in parts of Fresno, Tulare, and Kern Counties. There will be periods during the nonirrigating season when large volumes of stored water will be available for use in spreading operations, either by release from the main canal to irrigation canals and stream beds or for spreading water over areas suitable for infiltration and percolation to the several ground-water basins of the area.

The available spreading areas are made up of sandy loams, loams, and soils of finer texture which are incidentally lands of very high agricultural value. Field studies carried on by a cooperative research project on soils of Kern County reveal that, while initial infiltration starts off at a satisfactory rate, after a relatively short period of time the infiltration rapidly decreases. Laboratory and field studies of soil structure, bacteriological action and action of micro-organisms are now being carried on. Also various vegetative supplements are being worked into the soil surface. In some cases the results have been highly encouraging. The cooperators are of the opinion that some important leads have been produced and that continuation of the research will produce a solution to the problem of effecting the recharge of the ground-water aquifers.

WATER TOOK SPOTLIGHT IN OHIO

WATER, one of the great common denominators, holds many answers to our destiny. Water is the great giver of life to plants and animals, and an index to tomorrow's agriculture and industry. Water is important in both molecule and mass. It is of daily concern to physician, farmer, and hydraulic engineer. It is a fluid, a mineral, a gas, a solid—various of form and inconsistent of behavior. Climate, population, economic and social geography, the whole course of civilization, are at the mercy of water. Water has never ceased to command the attention of scientist, philosopher, and poet. But water still is reluctant to reveal its secrets.

Most recent effort to bring water into focus was the Eighth Annual Conference on Conservation, Nutrition, and Health in Athens, Ohio, last June. In cooperation with Ohio University, Friends of the Land brought to the rostrum nearly a score of top-flight authorities to exchange data and ideas pertaining to water and its ways. It was an historic event, one of many bold strokes by which Friends of the Land has won its eminence as an outstanding exponent of the conservation cause. Repercussions of this conference will be felt for many years, for it set in motion a machinery of thought that bears on watershed management, city and country water supplies, drainage and irrigation projects, the future of rivers and harbors, power developments, and human culture.

On the two following pages SOIL CONSERVATION Magazine presents brief summations of several of the addresses. Several other papers will be abstracted in future issues.

—WELLINGTON BRINK.

Next month: An important article by C. W. Lauritzen and O. W. Israelsen, "Canal Linings Tested in Field"

PLAN OR PERISH. (Ohio Conference.)—In the opening address, J. Russell Smith, professor of economic geography, Columbia University, laid emphasis on the dangers involved when water's place in nature's series of balances is disturbed. He cited the fate of the past cultures of Indus and Mesopotamia—cities ruined, abandoned, buried, and forgotten—as examples of what happens when mud gets ahead of man. Modern man, with new equipment, is building dams and tackling the Indus in modern style. How long he will keep ahead of it remains to be seen.

As an appalling example of the general human inability to read history and profit by it, Smith cited the Rio Grande Valley in New Mexico and west Texas.

A large section of the upper Rio Grande Valley drains into the magnificent Elephant Butte Reservoir which was built some years ago, he noted. After having done this, we permit overpasturing to break nature's balance of water-plant-soil. Nibbling beasts destroy the grass in wide almost-level upland valleys. After the sod is broken, gullies start and become little canyons and the fertile soil of the upland valley becomes millions of tons of silt that goes on down to choke the Rio Grande. As a result this river at Albuquerque has so filled its channel with sand, men have built dykes to keep the river from flowing over the valley. That was done years ago. It is still filling up its dyked channel with sand until now the stream bed is higher than the adjacent city. Yet more, the valley which once was good irrigated land can no longer drain into the river. Therefore it becomes waterlogged and farms are being destroyed by alkali, but the river is unable to carry its complete load on down to fill the Elephant Butte Reservoir.

I think this is one of the most perfect examples of regional suicide to be found anywhere in the world. First, we ruin an upland pasture. Second, this ruin causes wash to fill a channel of a river so that men must build artificial banks, dykes. Third, the filling of the channel raises the water table in the valley and irrigated land in the valley is ruined. Fourth, we build a great dam and turn a part of the valley into a reservoir to hold water to irrigate hundreds of thousands of acres farther down, but this needless silting is needlessly filling this beautiful reservoir. Fifth, the filling of this reservoir will stop most of the irrigation in fertile valley lands below and must inevitably turn many towns into roosts, which is the future of an irrigated settlement when the water is gone.

Smith would like to see a more comprehensive examination made of water than has ever before been undertaken.

We have twin problems, both menacing, soil erosion and water scarcity, he observes. Combined, this pair of devils has ruined many a land and their capacity to do this is increasing rather than decreasing now that machines have made man so destructive. Therefore, one of the pressing research needs is for as complete as possible a study of water, or of a river, beginning with the fall of the raindrop, following through their surface flow; rills, rivulets, creeks, rivers, runoff; absorption by soil, retention by soil, loss by evaporation, and all the problems of siltation, channel filling, flood. In other words, a complete study of water, including a complete study of a river. It is one of the pressing jobs which some foundation should take up.

WATER ACCOUNTING. (Ohio Conference.)—Water accounting is old as antiquity, the conference was told by C. V. Youngquist, chief engineer, Ohio Water Resources Board. The Temple of Roda, built by the Arabs at Cairo, Egypt, contained a well connected to the Nile. In this well was a gage of stone graduated in cubits for reading stages of the Nile. This gage has been read continuously since 622 A. D.—13 centuries of water accounting on the River Nile.

Prior to the building of the Roda Temple there are records of gage readings of the River Nile by the Egyptians extending back to 3500 B. C. The Palermo Stone, an ancient Egyptian monument on which were inscribed important events in the life of the Egyptians, contains frequent references to the gage height of the River Nile.

Why did the Egyptians and Arabs build elaborate structures for maintaining water accounts of the River Nile? Because water of the Nile was the very life blood of Egypt. Flow behavior of the Nile meant feast or famine. Water was recognized by this ancient people as their most indispensable and valuable natural resource and as such they were justified in elaborate means for measuring that resource. In fact, the whole economy of Egypt was regulated by the results of water gaging. An optimum gage height on the Nile gage meant a year of bountiful harvest and plenty, not only for Egypt but for much of the known world because Egypt became the world's granary.

Youngquist said that the modern world is beginning to appreciate that water can be a limiting factor to growth of population or industry. Western United States has been conscious of this situation for many years. The task of systematically measuring and accounting for the water resources obtained its greatest stimulus in the West.

The humid Eastern States have lately become conscious of the need of appraising and accounting for their water resources. While the quantity of precipitation may seem adequate, variations in the quantity and its distribution lead to acute problems of drought and flood. To properly cope with these problems requires that a systematic program for observing, measuring, and interpreting all phases of water occurrence in the hydrologic cycle be maintained.

The speaker described various methods being used to obtain water measurements at various points in the hydrologic cycle.

The collection of a vast quantity of data on water is not an end in itself, Youngquist was careful to note. It is the careful sifting and interpreting of such data which results in better understanding of water occurrence, of the quantities available for use and the best methods of utilizing water. There are still large blanks in our knowledge of the hydrologic cycle which will require much research to fill in. The data which have been collected have, however, greatly increased our understanding of water occurrence.

FITTING AGRICULTURE TO RAINFALL. (Ohio Conference.)—The necessity of fitting agriculture to the effective amount and seasonal pattern of rainfall was pointed out by C. W. Thornthwaite, director, Laboratory of Clima-

tology, Johns Hopkins University. He believes that several things can be done to bring water needs and rainfall more nearly together.

Since it is impossible to change the rainfall to fit the water need, changes must be made in other ways, he explained. One possibility is to increase the moisture-storage capacity of the soil. Every added inch of usable water in the soil is as good as an extra inch of rainfall and will delay the onset of drought.

Many farming practices reduce the storage capacity of the soil rather than increase it, Thornthwaite noted. Crop rotations, with the frequent use of grasses and legumes, improve the soil structure and increase its water-storage capacity. This and other conservation practices make the soil more absorptive, and less water is lost by direct runoff when the rains are intense.

A second possibility is to reduce the water needs of the crop. Plants that use less water, or farming practices that increase the efficiency of water use, could minimize drought.

Adjusting the crop calendar to anticipate time of drought, and making up the water deficiency by use of supplementary irrigation, were also suggested as good water-management procedures.

Not only is drought the greatest natural hazard to agriculture, but its stringencies are visited also upon the city dweller, for drought cuts down the quality of produce.

Foods that have suffered from drought are neither so good nor so nutritious as those that have not, Thornthwaite said.

Drought is hard to measure because we are not yet able to determine the water needs of plants very accurately, he concluded. Only when we have learned how to measure the combined evaporation from the soil surface and transpiration from plants, both potential and actual, shall we be able to combat drought intelligently.

WATER DETERMINES FLORA AND FAUNA. (Ohio Conference.)—Over the entire earth's surface available water and soil moisture determines which plants and trees, and what animals will inhabit the region, stated H. L. Shantz, retired head of the wildlife division of the United States Forest Service. Plants, he said, depend on the way they adjust themselves to soil moisture. Animals, in turn, must adjust themselves to the plants.

Most plants must have a constant stream of water passing into their roots . . . into and over each living cell . . . and out again into the air. If this stream is stopped for only a few minutes, many land plants will die. Shantz cited the amount of water passing through 10 fields of alfalfa plants in the middle of a bright summer day as being about a ton of water every 10 seconds.

On the other hand, many desert plants make great adjustments to the scarcity of water. Nature strikes a balance between the amount of moisture, the number and nature of the plants, and the animals which can live in the desert. A similar balance obtains in the ocean.

Shantz declared that the ultimate level of human progress depends upon the climate and the water supply.

It is most fortunate, he remarked, that water is our most abundant mineral. But if we expect to find it where we want it, we must learn to conserve it and to trap the raindrop where it falls.

MOISTURE, FERTILIZER, PLANTS. (Ohio Conference.)—Approximately 1,500 cubic miles of water fall upon the surface of the United States annually, Jackson B. Hester, soil technologist, told the conference.

Hester, in his discussion of soil moisture movements and their influence upon yields and fertilizer needs, said that nearly half of this 1,500 cubic miles of water evaporates and in the neighborhood of one-fourth flows off in the surface stream. The remaining 25 percent works its way into the earth's crust. He estimated that the quantity of ground water within the first hundred feet of surface soil amounts to a layer equivalent to 17 feet of water over the entire surface of this country.

As the water passes by the plant and into the deeper regions of the earth's crust, it carries with it much sodium, chlorine, sulphur, and other excess ions which are not needed for plant growth, but which came in with the fertilizer that was applied, Hester explained. This keeps the soil from becoming too salty and is beneficial for the crop.

It is absolutely necessary to keep plants growing all of the time on soils that are subject to leaching under humid conditions, he contended. This will prevent leaching of the badly needed elements and lessen the movement of water. Furthermore, the plant food tied up in this organic matter would be less subject to leaching during the interim in which the crop is decomposing and a successive crop is being established. Free water can move into the sub-surface soil during such periods without removing large amounts of plant food.

However, Hester observed, our agricultural practices which are geared to a cash economy make it sometimes difficult to follow this practice.

CRITICAL SHORTAGES. (Ohio Conference.)—Water shortages are not a recent development, according to J. V. B. Wells, chief, surface water branch, United States Geological Survey. Temporary and localized shortages have been experienced since our country was first settled.

Records of stream flow and climatological data indicate that, although some trends may be downward, there has been no substantial country-wide change in rainfall and runoff in the past 50 years. Therefore, our present water shortages result mainly from increased consumption.

The crux of the matter, as Wells sees it, is that the use of water had increased out of all proportion to growth of population. Industry, using vast quantities of water for cooling and other purposes, the increasing use of irrigation water in parts of the East to supplement rainfall during critical periods in the growing season, and extensive air-conditioning are just a few of the modern demands for water.

Wells believes that the Nation-wide inventory of surface- and ground-water resources, both as to quantity and to quality, is a prerequisite to understanding and solving water problems.

Our water shortages are disquieting, and in some instances may prove costly to remedy, Wells concluded. Nevertheless, by combining intelligent utilization with adequate basic information, at no time in the foreseeable future need our country's development be hampered by lack of water.

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SOIL CONSERVATION •

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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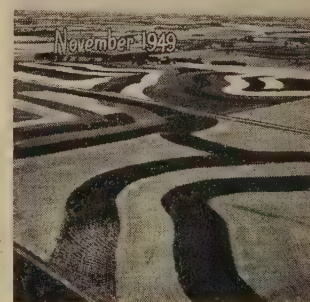
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CONSERVATION CALENDAR.—Calendars generally start with January. Accustomed to originating ideas that diverge from old ways of doing things, the supervisors of the Gillespie County (Tex.) Soil Conservation District, however, have put out a calendar that starts with July.

A picture on the calendar shows a fence-line contrast between a well-managed pasture and one savagely over-used. On the left side of the page for each month of the year is a list of the conservation practices that should be applied in the current month. On the right side is a pertinent statement about conservation. The statement for October reminded landowners of the election of a district supervisor to represent subdivision 1.

Small advertisements of local firms paid for printing. —DUDLEY T. MANN.



FRONT COVER.—Air view northward from Hart, Minn. The farm of Walter Feine is in the foreground; just beyond, the farm of Willard Feine. Past the Willard Feine property, also in strips, are the farms of Leo Heiden, Otto Brand, George Meyers, John Kryser, William Holz, and Emil Cordes. The photograph was made by W. H. Lathrop.

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AMERICAN INDUSTRY AND THE LAND

By WALLACE F. BENNETT

THE HARD fact that land and other natural resources are not inexhaustible has been clear to thoughtful observers for a long time. It did not emerge as a result of the rapid expansion of the industrial age. As long ago as 400 B. C., Cato, the Roman, laid down a number of principles regarding preservation of the land. In our own country, George Washington and Thomas Jefferson, among other early Americans, warned their fellow countrymen against wasteful use of the soil.

However, conservation has one fairly new aspect—which is becoming more sharply delineated every day. Conservation always has been necessary. But in former times man could postpone his reckoning with nature by emigrating from an area which he had exhausted of fertility. Now there is practically no place left for him to run to.

We have to stand and fight for what we have—in the place where we are. Either we maintain and improve our basic wealth—timber, soil, and water—or we allow them to decline. If they do decline, so will our standards of living, our individual freedoms, and the very security of our country.

Industry is acutely aware of the urgent necessity for action in the field of conservation. As a reflection of that awareness, the National Association of Manufacturers has set up a new committee group—the Committee on Timber, Soil, and Water Conservation. More than 70 manufacturers, representing both small and large companies, have consented to serve this year on the committee. All have a deep interest in conservation, and special knowledge of certain phases of the problem.

The chairman of the committee is George M. Gadsby, president and general manager of the Utah Power & Light Co., Salt Lake City.

C. M. Malone, vice chairman of the Second National Bank, Houston, Tex., and Lloyd Partain, manager of the commercial research division, Curtis Publishing Co., are vice chairmen.

Each of these men brings to the voluntary task of guiding the work of the committee a long and active personal history of conservation work and study.

Gadsby is an authority on the country's water supply, whose falling levels represent one of our most serious conservation problems.

After graduation from the Massachusetts Institute of Technology in 1909, Gadsby joined the Warren (Pa.) Water Co. as a chemist, and later became its superintendent. Before joining the Utah Power & Light Co. in 1929 as president, he was associated with various utility companies, including the West Penn Power Co. in Pittsburgh, of which he was president.

NOTE.—The author is president, National Association of Manufacturers.

In addition to serving as chairman of the full NAM Conservation Committee, Gadsby heads the subcommittee on water conservation.

Malone is director of Friends of the Land, and has devoted much time and energy to organizing the soil conservation movement in Texas. He has directed a continuing campaign to enlist the support of every individual, group, and business in his State in preserving the soil—because, as he puts it, “every inch of topsoil lost will affect everybody’s living conditions in the years to come.”

He is also serving as chairman of the subcommittee on soil of the NAM group.

Partain, who heads the subcommittee on timber, long has been active in conservation work and has done a considerable amount of research in the field. He is the author of numerous articles on conservation and has addressed many audiences on various phases of the urgency of protecting our natural resources.

The NAM Conservation Committee has begun its work in the consciousness that industry has an obligation to make the fullest possible contribution to conservation of our resources, as this country enters upon a third, critical phase of its existence.

In the first period, our forefathers’ principal objective was the acquisition and occupation of land. The expanse of America seemed limitless; the relationship with the land was in those times to win it and to tame it.

Next came the stage of developing the land that had been conquered. This our people did with magnificent energy—but with too little regard for the future of our renewable natural resources. It seemed then that we could never run out of new land, new timber tracts, and water.

Having conquered and developed the land, we are now beginning a third period. The remaining small areas which may be made productive are not likely to be significant. No longer can we abandon one place and move along to another. The wisest use of all of our land, timber, and water is fundamental to the economic and social welfare of our entire population, and to the security and strength of our position among nations.

According to a conservative estimate, 65 percent of all the new wealth created in this country originates in renewable natural resources—as agriculture and forestry. The other 35 percent is from

nonrenewable sources, such as mining and petroleum. It seems clear that as our nonrenewable resources diminish, we are apt to become more and more dependent upon our renewable resources.

Should we allow our renewable natural resources to fail, our American way of life will be affected seriously. One of the reasons this Nation has been able to develop its highly productive industrial economy, which has raised the living standards of all to such high levels, is that it has taken only a comparatively small amount of our national energy to feed ourselves.

Specifically, about 25 cents out of the American dollar, on the average, is spent for food—which leaves about 75 cents for processed and manufactured goods of all kinds. This can be directly attributed to the fact that we have had available so vast an extent of productive land and forests.

England, by comparison, must devote about 35 cents out of a dollar for food; Italy, 55 to 70 cents; and in China or India, some 90 percent of the monetary units must go just to satisfy hunger.

These money ratios can be translated roughly into human time and energy. Food is our first need and if necessary, all of our efforts will be expended in getting it. The less effort required for food, the more we have left for the production of other factors which make up a prosperous and progressive civilization.

The first task of the NAM Committee on Timber, Soil, and Water is to determine what is now being done in the conservation field. Then it will survey the need for action in those areas of the problem in which industry and the NAM as an organization can be helpful. The committee is seeking to cooperate with all other groups and agencies concerned with preservation of our natural resources.

Conservation is vital to the well-being of every individual in the nation. It is of immediate urgency to industry, as to every part of our productive economy—and it is my belief that industry has a major role to play in the effort to make conservation an active principle in our national life.



DISTRICT PROFILE

CORNWALL of WASHINGTON



J. W. Cornwall.

J. W. "Wes" Cornwall has built up a run-down 400-acre wheat ranch in the famed Palouse country of eastern Washington to the status of a 2,100-acre conservation show place. He is a big friendly man with a zest for farming and a love for soil. Over the past 10 years he has become one of the Northwest's great champions of soil conservation.

"Wes" Cornwall was not a born conservationist. He concedes that he had to learn about erosion and soil depletion the hard way. Looking back to the 1920's, he recalls with a grin that he was just about the worst farmer in the county. "I did everything wrong. I mined the soil and never put anything back. The easiest way to get rid of stubble was to burn it. People talked about humus and carbon-nitrogen ratios in those days but it went right over my head. I didn't see any need for systematic crop rotations. All I thought of was wheat. Worst of all, I was a fallow farmer. It's no wonder I almost went broke!"

Cornwall says he "woke up" along about 1933-34. "By then, my wheat yields were down to the point where I knew I either had to change my methods or quit. Several years before, I had switched from the use of a binder to a combine. Putting all of the straw back on the land was too much of a shock to the soil. My yields decreased rapidly. That was bad but erosion was even worse. Between the two I was about licked. It looked like erosion and lack of fertility were going to run me off the place."

Cornwall sought out William J. Green, long-time county agricultural agent for Spokane County, and asked advice. Green was a believer in the use of sweetclover to build fertility and restore organic matter. He told Cornwall, "You can't use stubble without using sweetclover—both must be used." He also urged Wes to seek help from the Soil Conservation Service. That Cornwall did. Technicians interested him in a systematic crop rotation which included sweetclover, alfalfa, and grass. They went over his place, field by field and acre by acre, showing where erosion was worse in

some places than in others, how he could control it, what he needed to do to get his farm back on a paying basis. They worked out a detailed conservation farm plan. Cornwall still has that first plan, as well as additional plans drawn up later as he added new land to his holdings. But it has been many years since Wes Cornwall has had to refer to such a plan. He has been farming the conservation way so long now that it is second nature.

From the time Cornwall became a conservation farmer he had crusaded ceaselessly to get others interested in putting a stop to erosion. He started by talking conservation among friends and neighbors.

Cornwall ruefully admits that he may have "rubbed a few people the wrong way" in his enthusiasm. His neighbors in the Mount Hope community sometimes find it hard to understand the change that has taken place in Wes Cornwall. Commented one, "When young Wes first started farming, he didn't even know what soil conservation meant. But to hear him talk today, you'd think it was a crime to let a little soil wash away." The comment is accurate. When Wes Cornwall starts talking about soil conservation he is deadly serious. The lingering twinkle in his eye disappears and his jaw takes a determined set. He doesn't think anyone has the right to destroy soil and seldom hesitates to let others know how he feels.

In 1936 Cornwall worked with Green and others in organizing a soil conservation association in his

community and later, in 1939, played a prominent role in persuading the Washington legislature to pass a soil conservation district law. He was a leading figure in organizing Latah-Rock Creek Soil Conservation District and has been active in district affairs ever since.

Cornwall's zeal thrust him into State-wide prominence in 1946 when he was named president of the Washington Association of Soil Conservation Districts. This association sent him to the annual meeting of the National Association of Soil Conservation Districts in 1946 and again in 1947. He attended at his own expense in 1948 and 1949. His warm personality and friendly, sincere counsel have earned him scores of friends among the national leaders in soil conservation. He has worked diligently toward a Nation-wide policy in promoting conservation through soil conservation districts but has never lost sight of the needs of his own community. He is still an active officer of his local district, where his booming voice and hearty laugh are familiar parts of most meetings of the Latah-Rock Creek board of supervisors.

Cornwall gets frequent requests for the magic formula that made it possible for him to transform a run-down, 400-acre Palouse ranch into a 2,100-acre soil conservation show place. "There isn't any magic formula," he says, "it's just common sense and hard work." He does, however, pass along some tips: "You can't control erosion without working stubble back into the soil. And you can't use stubble without growing legumes, prefer-

ably alfalfa or sweetclover in a mixture of grass. Legumes add nitrogen and stubble adds carbon. Both add organic matter. But when you use one, you have to follow up with the other to get the right balance. Legumes open the ground so moisture can get in instead of running off. Mix grass with both sweetclover and alfalfa. It will more than double the amount of roots you get in the soil. When you work stubble, disk it roughly and leave a large portion on the surface. Stubble rots quicker that way and soil clings to it better. Use all the manure you can and never summer-fallow in areas where the annual rainfall is 18 inches or more. Few Palouse soils can hold more than 1 year's rainfall at a time. Heavy rains after summer fallowing are almost sure to cause erosion."

Wes Cornwall is not farming alone anymore. He's getting lots of help from his two young sons, Don and Neal. Both are chips off the old block and are sticking closely to their dad's soil-saving methods. Cornwall now divides his time about equally between three major interests—the ranch, soil conservation, and a newly acquired farm-implement agency in nearby Fairfield. Merle, his wife, is trying to create a fourth major interest—their new home in Spokane. She hasn't had too much success. Her arguments frequently go like this, "Wes, why don't you quit trying to stop all the erosion in the State of Washington in 1 day. It can't be done." Wes Cornwall knows she's right. But he probably won't quit trying.

—W. L. SOUTHWORTH.

SMOOTHING OUT THE RICE FIELDS

By DELOUIS SOILEAU

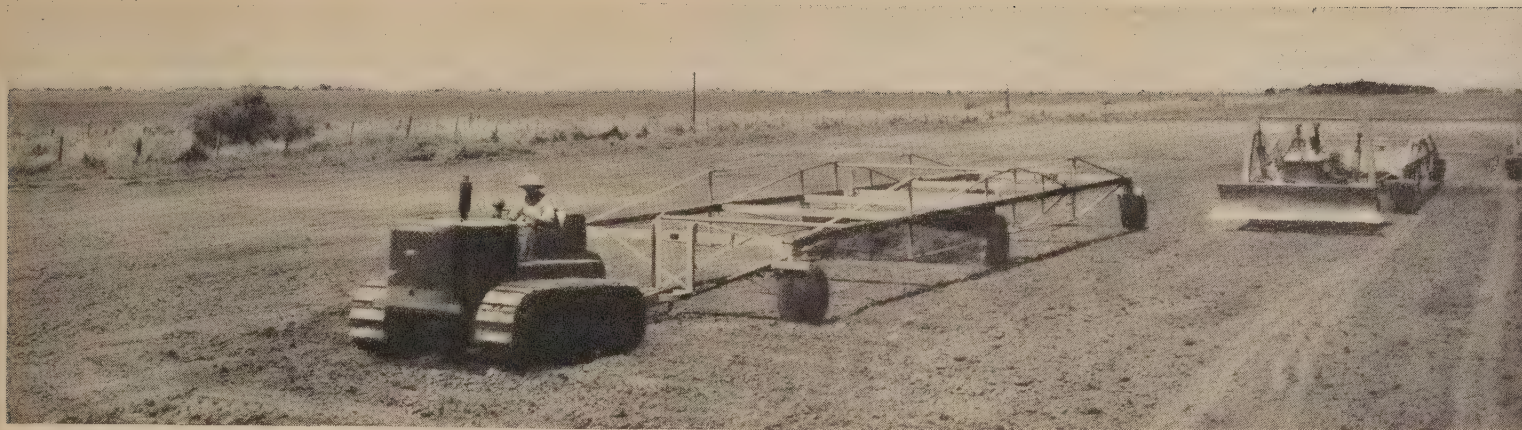
PASTURE rotation and land-leveling operations by big machines are boosting yields of rice in Louisiana. It may not be many years before Louisiana catches up with California in rice production per acre.

Much credit is due Maple Hughes for the trend toward land leveling in the Louisiana rice belt. A rice farmer himself in the Lake Charles area, Hughes went to California in 1946 to find out why west coast farms produce more than twice as much rice per acre as Louisiana farms. The only dif-

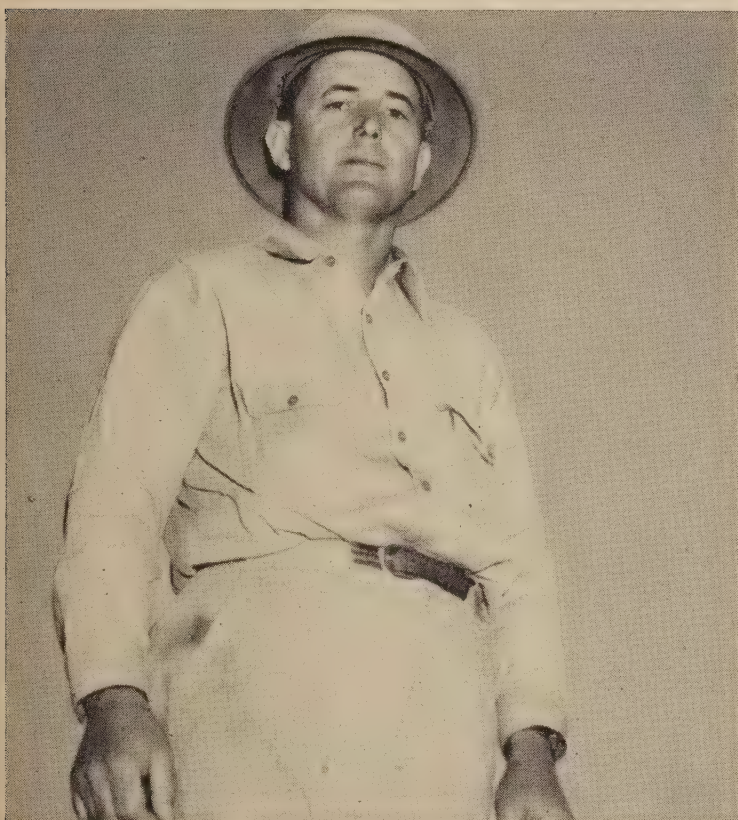
ference he could figure out was that the Californians leveled their rice fields flat as a pancake. On the other hand, Louisiana farmers left their fields studded with mounds or knolls. Most of the mounds were small, generally running from 1/2 to 4 feet in height. Some of them were big, 25 or 30 feet long, 15 or 20 feet across, and 5 or 6 feet high. The farmers tried to grow rice on the smaller mounds by raising the level of the irrigation water. That took a lot more water but it didn't produce very much more rice. When you count in the area of all those unproductive mounds, it's no wonder rice yields in Louisiana were low.

When Hughes returned from California he bought some of the big land-leveling machinery.

NOTE.—The author is with the Soil Conservation Service, Crowley, La.



These 60-foot land-leveling machines are putting the final touches to an 80-acre rice field on the Maple Hughes farm. Usually twice back and forth across the field is enough. When this fifth step in leveling operations is finished, the field is smooth as a billiard table, and the soil as soft as velvet.



Maple Hughes.

He went to work on his own farms and told all the farmers he knew about his observations in California. Because of his interest in modern farming, he was elected to the board of supervisors of the Gulf Coast Soil Conservation District and made vice chairman.

Land leveling is rated by the Soil Conservation Service as an important practice in a coordinated program for rice farms. Convinced of the value of land leveling, the Gulf Coast District, in which mounds are common, not only adopted the practice but bought a bulldozer and two land levelers for cooperating farmers to use in flattening out their fields.

Hughes went to work leveling his rice fields. His first real test of production came in 1948 when he leveled and planted a 45-acre field to rice. His yield was 24 barrels of dry rice per acre.

"I had never raised more than 10 barrels on that field before," Hughes said. "Usually it was 8 or 9 barrels."

On another farm Hughes increased his yield 5 barrels per acre on a 250-acre field. He said:

"I leveled the field in May 1948. I seeded some of it by drill and water-planted the rest by plane. I needed only half as much water as formerly and that was a lifesaver in a dry year. I had to irrigate 300 acres for a neighbor as well as 600 acres of my own, all from two wells.

"I saved half the labor usually required in irrigation. On top of all that, I got 13 barrels per acre with Rexora rice on my 250-acre field. On an adjoining 160-acre field, where all conditions were the same except that it had not been leveled, my yield ran 8 barrels."

Land leveling costs \$10 to \$15 per acre where conditions are average. A big land leveler does 30 acres a day.

"I plan not to plant any more fields to rice until they have been leveled," Hughes stated. His conservation program also includes improvement of pastures with high quality grasses and clovers and rotation of rice and improved pasture.

With Hughes' experience to guide them, about half the farmers cooperating with the Gulf Coast Soil Conservation District have added land leveling to their general conservation program.

Land leveling provides for more efficient irrigation and drainage, thereby enabling the farmer to grow grasses and legumes that add organic matter

(Continued on page 92)

CANAL LININGS TESTED IN FIELD

By C. W. LAURITZEN and
O. W. ISRAELSEN

LOSSES in conveyance of irrigation water represents one-third to one-half of all the water diverted for irrigation purposes. Since there is more land which could be irrigated than there is water with which to irrigate it, conveyance losses constitute a limiting factor in western agricultural development. These losses could be greatly reduced, if not largely eliminated, by lining irrigation canals and laterals. This fact is generally recognized and yet, of the 125,000 miles of canals and laterals in the Western States, only about 5,000 or 4 percent are lined. The primary reason more canals are not lined is the high cost. Cost, however, is relative and as agriculture and industry expand the pressure to provide water to meet increasing requirements will result in the gradual lining of a large percentage of the canal mileage in contrast to the low percentage today.

The initial expenditures necessitated by a general canal lining program would be great but maintenance costs should be considerably less. Some canals have been lined since the early days of irrigation. Nearly every type of construction material has been used with varying degrees of success. The problem today is to develop better and cheaper linings. Research has brought substantial progress in the use of new materials and the improvement of construction methods. Continued investigation is the best way to advance progress and provide information which will save water users heavy expenditures in the future.

The demand is growing for information on canal lining. In some instances irrigators and commercial firms are undertaking research at their own expense; others have shown sufficient interest to make contributions to organizations engaged in canal-lining research. This article cites an instance in which a group of irrigators and a number of other interested concerns pooled their efforts to advance canal-lining research.

The water which supplies the Richmond Irrigation Company Canal represents a portion of the natural flow from High Creek. High Creek is a



Precast concrete slabs over a soil-bentonite lining in foreground, and precast concrete slabs with mastic-sealed joints in background.

stream located in the vicinity of Richmond, Utah, and like all mountain streams in western United States is characterized by large flows in the spring and early summer which decrease rapidly with the advance of summer. Since water was first diverted from High Creek to the company canal there has been a shortage of water late in the season with the result that most of the farmers in the area must limit their crops to those which mature early. The irrigators for many years were aware of the heavy seepage losses but did nothing to correct them.

In the summer of 1947 a number of the directors of the company visited the Irrigation Research Laboratory at Logan, Utah, as a part of an Extension Service tour. At the laboratory, which is operated by the irrigation division of SCS in cooperation with the Utah State Agricultural Experiment Station, they observed a number of different types of canal linings being tested to determine their characteristics as a basis for the

NOTE.—The authors are, respectively, project supervisor, division of irrigation research, Soil Conservation Service; and irrigation engineer, Utah Agricultural Experiment Station, Logan, Utah.



Butyl-coated fiberglass lining showing lap joint. The 4-year-old lad belongs to co-author Lauritzen.

development of better and cheaper lining materials. It was found that most of the seepage from any canal usually occurs in rather localized sections and that the first step in undertaking a canal-lining program should be to determine the location of heavy losses. The company officials felt they knew where the heavy losses were to be found and with the assistance of the Extension irrigation specialist made some measurements which demonstrated that 51 percent of the water was lost in a canal length of about 2,200 feet beginning at the point of diversion from High Creek and ending where the canal left the gravel fan at the mouth of the canyon and took its course over the finer textured lake-laid sediments. They were astounded at the amount of water they were losing in this short distance and contacted the irrigation division of the Soil Conservation Service for guidance. Some general recommendations were made and it was suggested that they employ an engineer and have him prepare specifications for lining the section found to be subject to this heavy loss. A few weeks later, however, company officers returned and asked if the Soil Conservation Service or the college would direct the job. Eventually, Service and college undertook a strictly research project on a cooperative basis. It was agreed to try out a number of different linings, some of which would probably require abnormal maintenance and might indeed have to be replaced.

Inasmuch as the installation of a field test would be more costly than a standard lining job, three commercial firms interested in sponsoring the use of certain materials were asked to participate. They accepted and made substantial contributions in labor, materials, and technical advice. Construction was begun in March 1948 and, after an interruption to permit water deliveries through the summer, was resumed and completed in the fall of the same year.

The field test at Richmond consists of 729 linear feet of concrete, 400 feet of shotcrete, 300 feet of precast concrete slabs, 100 feet of gravel-covered soil-bentonite, and 113 feet of butyl-coated fiberglass, in the main canal. These linings were supplemented by 200 feet of butyl-coated fiberglass lining in one of the major laterals. Associated control structures included 230 feet of 24-inch and 75 feet of 12-inch galvanized pipe; a culvert of 4-foot concrete pipe 40 feet long, one drop structure and three concrete diversion structures.

The original canal skirted along the foot of a gravel escarpment. It was winding and its banks had a heavy growth of trees and shrubs. In cross section it was 10 to 15 feet wide and about 1 foot deep. The cost of clearing and shaping the old channel for lining was estimated to equal the cost of relocation, even though some rather heavy cuts and fills were involved. It was decided to relocate in order to provide better alignment. In so doing, the length of this canal section was reduced by 500 feet.

The concrete linings included two thicknesses, 3-inch and 2-inch, with and without reinforcing. Steel bars $\frac{3}{8}$ inch in diameter placed on 1-foot centers both ways was the reinforcing used in the 3-inch concrete. In the 2-inch concrete, No. 10 wire mesh having 6-inch openings was used. The concrete was placed in 10-foot panels. Alternate



Concrete lining under construction.

panels were installed and after the concrete had hardened the connecting panels were poured, employing the panels poured first as guides for shaping the connecting panels. The alternate panels poured first were all of standard concrete, the mix employed being approximately 1:2:3. Maximum size of aggregate was 1½ inches for the 3-inch concrete and 1 inch for the 2-inch concrete. Two types of finishes were used, the standard steel trowel finish of years past and a broom finish. These two finishes were applied alternately to each successive panel in the order of their installation. Standard concrete to which an air-entraining agent, vinsol resin, was used in pouring the connecting panels. The two finishes used with the standard concrete were repeated with the air-entrained concrete, following the same sequence. It will be seen, therefore, that the concrete linings include comparisons of two thicknesses of concrete, concrete of the same thickness with and without reinforcing, and two types of finishes; each of these for both standard and air-entrained concrete.

Shotcrete linings of four different specifications were installed to obtain further information on the comparative value of this type of lining, the need for reinforcing and the minimum thickness which would be required to be serviceable under conditions in this area. The four experimental sections consisted of 100 linear feet each of 2-inch shotcrete with and without reinforcing and 1½-inch shotcrete with and without reinforcing. No. 14 wire mesh with 2-inch openings was the reinforcing material used in both the 2-inch and 1½-inch shotcrete.

Three sections of precast concrete slabs were installed. In one section the slabs were laid directly on the subgrade and the joints sealed with a mastic. The other two sections of slabs were laid in one case over a 4-inch blanket of soil-bentonite and, in the other, over a 4-inch blanket of silt loam of moderately low permeability. In the latter two sections the slabs functioned chiefly as a protective covering for the low permeability earth linings which they topped.

The gravel cover over soil-bentonite lining could not withstand the velocities encountered at the head of the section as the water left the concrete and an additional covering of rock riprap was made to afford the necessary protection. While the rock riprap might have been restricted to the head of the section it was extended to cover the entire section as a precautionary measure.

The butyl-coated fiberglass was manufactured specifically for the tests at Richmond and similar experimental installations at other locations. It consists of butyl rubber calendared onto fiberglass cloth, the cloth having 10 threads per inch both ways. The fabric resulting is approximately 0.03 inch thick, fairly strong and highly resistant to deterioration from weathering and biological activity. To employ the fabric as a lining for canals, it was laid directly on the subgrade and anchored in

place by burying the edges along the sides and the upstream end in shallow trenches. The downstream end is left loose and laps over the upstream end of the succeeding length of fabric. The experimental installations have been made in 30- to 50-foot lengths. The lengths might be made longer or shorter. It will probably be desirable to limit the length to 50 feet, however, to facilitate installation and to localize damage in the event water gets under the lining, whether it be due to a break in the fabric or other circumstances. Since the joint is open, any water which gets under the upstream length of fabric will take its course on top of the lining in the next section. This protective feature is the basis of the joint design adopted.

The total cost, including contributions except for technical services, was slightly less than \$10,000. There are approximately 6,300 shares of stock in the company, slightly more than a share per acre of irrigated land. To finance the cost of the lining, the company has increased the assessment from \$0.75 per share to \$1.50 per share. This increase in assessment will pay the cost to the company in 2 years time. The water available in late season will be nearly double, as a result of the reduced seepage losses from the section lined. Canal maintenance costs will be reduced in the future, and delivery efficiency increased. It seems probable that increased crop production will add greatly to the returns on the investment.

Irrigation companies can line their canals without incurring heavy indebtedness by lining short sections each year and financing the work on a pay-as-you-go basis. It is important, if such a procedure is adopted, to precede any lining by the preparation of a complete plan of lining and improvement, including a general design, supported by field surveys and an evaluation of site conditions. This is necessary if the finished job is to have good alignment and advantage is to be taken of opportunities for shortening the canal. It is desirable, although not essential, to determine the specific lengths of canal in which seepage losses are greatest, since lining these sections first will increase the efficiency of the system the most per dollar expended.

There has not been sufficient time to test the relative durability of the various experimental linings. To date, all are intact and functioning satisfactorily. It appears that under certain circumstances the character of the butyl-coated fiberglass installations may have to be modified and it may be that the fabric itself will be subject to deterioration under certain flow conditions. Because of the experimental character of the linings it is anticipated that above-average maintenance costs will be associated with some types of lining represented and after a few years certain linings may have to be replaced.

Field tests such as the one described are an essential part of canal-lining research. At Logan the canal-lining research program may be subdivided into three parts as follows:

1. Investigation of materials for canal lining, such as an evaluation of physical properties and ways of modifying these properties.
2. Model testing of linings to determine their behavior

(Contained on page 89)

THESE YOUNGSTERS MADE FRIENDS WITH THE SOIL



A mighty important subject grips the eyes and minds of these children, as they get a preview of what they will see on their field trip.

By **LESTER FOX**

CITY KIDS aren't letting their country cousins get ahead of them in knowing all about the need of conserving our soil and water resources. Institutions like the Fort Worth Children's Museum are seeing to that.

The museum in the Texas cowtown is looking out for the welfare of the city's youngsters in a variety of ways. One is a summer study course for children of all ages from 5 or 6 up to 14 or 15. Each week a different subject is studied. Once a week the children are taken on a field trip so that they can see and feel the things they have been studying.

One week recently the youngsters studied about soil conservation. Then they took to the field to look things over. Before they started they heard a short talk about the things they were to see and

viewed enlarged photographs of erosion and of measures that control erosion and maintain the productiveness of the soil. The talk was given by David O. Davis of the Soil Conservation Service in the museum's little theater where educational movies, art crafts, puppet-show writing, costuming and staging, and a lot of other activities keep the children busy during the year.

The field trip was made by chartered bus. Davis went along and pointed out the things the children should observe, just like a barker on a rubberneck bus for tourists. At selected spots stops were made where the 35 children hopped out and Davis explained things while the youngsters actually observed what he was talking about.

Mrs. Anne H. Webb, director of the museum, well versed in conservation herself, helped on the tour. Mrs. Webb plans and conducts the museum study courses and other activities.

NOTE.—The author is information specialist, Soil Conservation Service, Fort Worth, Tex.



Roadside erosion is considered here.

At one stop the children observed roadside erosion while Davis told them what caused it, pointing up an adjacent slope where a gully had started and cut its way down to the road and then gouged out a deep and dangerous ditch along the roadway.

At another stop the children saw a field of weeds and inferior grasses. They were told how once the field was covered by Nature with tall, nutritious grasses that were plowed up for row crops. With the good cover of grass gone, there was nothing to protect the soil against lashing rains that washed the topsoil down the slope. Soon the field was no good for row crops. Eroded and depleted, it was left idle. Weeds and poor quality grasses came in. Now the field furnished only a little low-grade grazing. All of this was explained in simple language that the youngsters could understand and remember.

The bus made another stop where the land had been properly protected and there was an abundance of good forage grasses. The children saw what good grass looked like. They felt it and examined it.

A popular stop was made on the Clear Fork of the Trinity River where the water was fresh and sparkling and the riverbed pebbled with interesting stones. There the children enjoyed the lunches they had brought. Then they waded in the cool water, examined the riverbed and learned how that peaceful Clear Fork has on numerous occasions caused serious flood damage because of eroded and depleted farm land further up the watershed.

After lunch Davis summed up what the youngsters had seen. When they returned to the museum the youngsters filled out a questionnaire that brought out the knowledge they had gained.

On the ride back to the museum one little boy, 7 or 8 years old, pointed out the bus window to an ugly gully. Turning to his younger companion, he said:

"That's soil erosion. Isn't it pitiful?"



Not always is this stream pleasant for wading. These children learned why.

PROFITS FROM IRRIGATED PASTURE

By A. J. WEBBER

MMURRAY WEBB, dairy farmer of St. George, Utah, and owner of the highest-producing herd in Washington County during 1948, figures that irrigated pastures are worth \$230 an acre annually, according to A. J. Webber of the Soil Conservation Service.

Webb has been cooperating with the Lower Virgin-Santa Clara Soil Conservation District since August 1940. It was not until 1946 that he planted his first irrigated pasture. This planting was made on 3¼ acres of fairly good agricultural land which had become affected by a high water table.

NOTE.—The author is district conservationist, Soil Conservation Service, St. George, Utah.

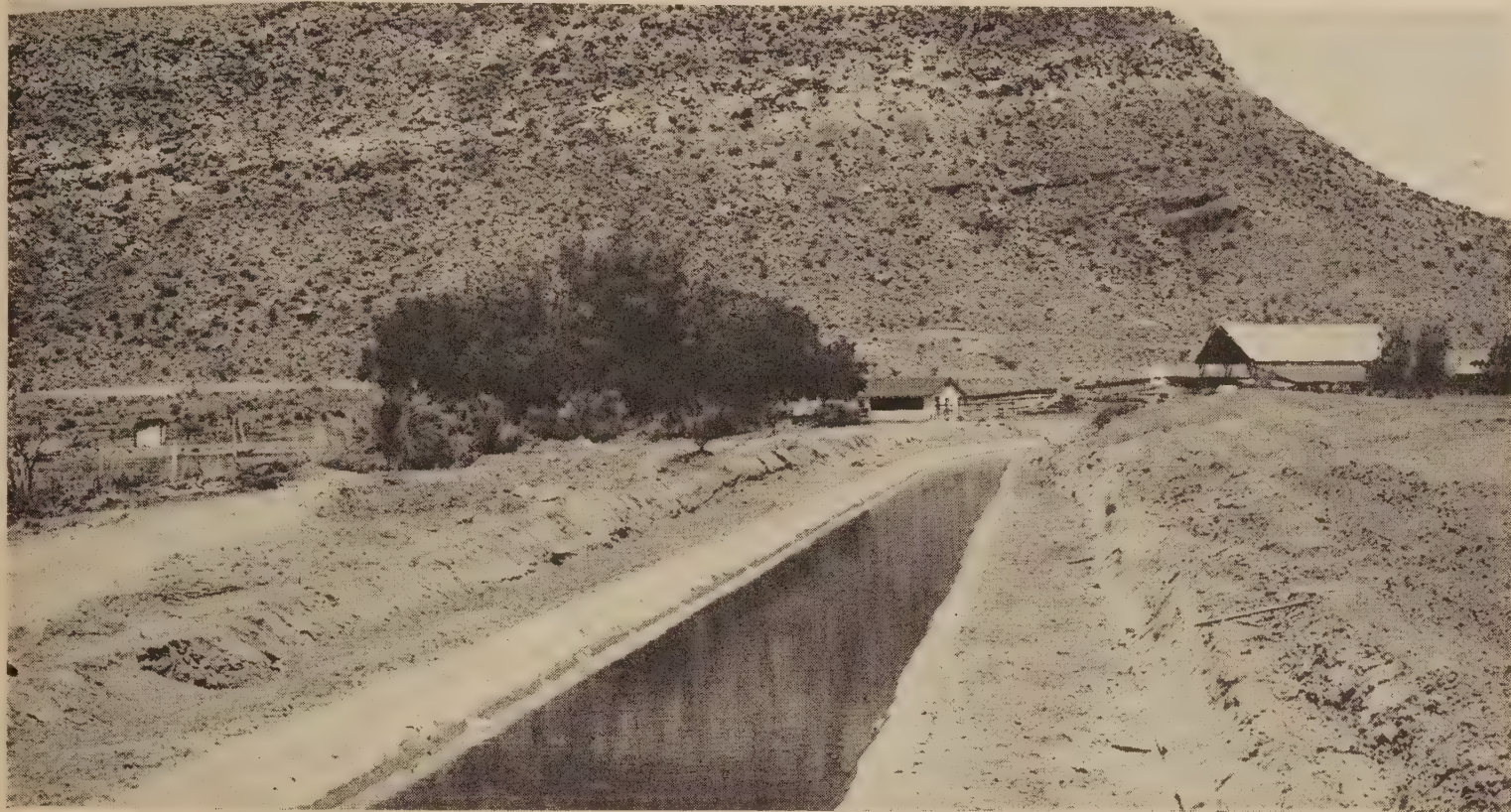
First, Webb used a Soil Conservation Service dragline on loan to the district to construct a drainage ditch to make the tract more suitable for improved crop production. The pasture was planted as a demonstration in cooperation with the district. The Soil Conservation Service provided a seed mixture including perennial ryegrass, orchard grass, meadow fescue, alfalfa, yellow sweetclover, and Ladino clover.

Webb did an excellent job of getting the pasture started by preparing a good seedbed and by

applying the proper amount of irrigation water when needed.

After the pasture became well established, Webb divided it into three fields for rotation grazing. These fields also served as a basis for three trial fertilizer treatments in connection with the demonstration.

Pasture No. 1 received 10 tons of barnyard manure, 200 pounds of 43-percent treble superphosphate, and 175 pounds of ammonium sulphate per acre per season.



Here's the ditch from which Webb irrigates.



Murray Webb estimates that the $3\frac{1}{4}$ -acre irrigated pasture on which these Jerseys and Holsteins are grazing is worth \$230 per acre annually to him in increased butterfat production and lowered feed costs.

Pasture No. 2 received 10 tons of manure and 200 pounds of 43-percent treble superphosphate per acre per season.

Pasture No. 3 was given 12 tons of barnyard manure per acre per season.

Pasture No. 1 yielded 25 percent more forage than did the plot receiving manure alone. Pasture No. 2 yielded 16 percent more forage than No. 3.

The 1948 grazing season lasted from April 17 to November 30, or a growing period of approximately 7½ months. This gave a total of 1,475 animal-months grazing with an average yield on the entire pasture of 2.1 animal-months grazing per acre. An average height of 4 inches of grass growth was left on the pasture at the close of the grazing season.

According to the 1948 records of the Washington County Dairy Herd Improvement Association, Webb's herd of 16 head of Jersey and registered Holstein cows produced an average of 435 pounds of butterfat per cow during the year. His average butterfat production had been 418 pounds for 1947 and 390 pounds for 1946. Webb attributes this consistent increase in butterfat production to improvement in the quality of his herd, proper management, improved feed rations, and a good pasture.

"Every day my dairy herd was on this pasture was worth \$10 saved in feed costs and in increased production," Webb declared.

Calculated on the basis of increased milk production while his dairy herd was grazing on the pasture and on the basis of reduced hay consumption during that time, the irrigated pasture was worth \$230 an acre annually. In determining this value, Webb estimated alfalfa hay at \$25 a ton, and the price of milk at 38 cents a gallon.

As a result of this and other trial plantings in the St. George area, it has been observed that certain grass species yield better than others. A higher-producing mixture than the one used by Webb now is being generally recommended for irrigated pastures in the Lower Virgin-Santa Clara Soil Conservation District. This mixture includes perennial ryegrass, orchard grass, tall meadow oatgrass, alto fescue, alfalfa, Ladino clover, and yellow sweetclover.

Because of extreme variations in climate and soil conditions in this locality, no one grass mixture is recommended for all plantings. Technicians recommend a check of soil, water table, alkali, and water conditions on all areas designated for pastures in order to arrive at the most suitable mixture.

HOW GOOD FISHING CAME TO BUFFALO LAKE

By PHILIP F. ALLAN

BUFFALO LAKE—listed on Soil Conservation Service records as Tierra Blanca Land Utilization Project, TX-LU-21—is a good place to fish. It hasn't always been good. In fact, the fishing a few years ago was downright poor. But now you can be fairly certain of a nice string of channel cats, bass, bluegills, or crappies.

Buffalo Lake varies in area, according to rainfall, from less than 300 acres in the driest years to more than 1,800 acres in the wettest. It can hardly be called a pretty lake, although picturesque canyons flank its lower reaches. In fall and winter waterfowl visit it by the tens of thou-

sands—mallards, pintails, teals, redheads, canvasbacks, Canada geese, and a host of others—all protected from hunters' guns.

Buffalo Lake was first opened to fishermen in June 1940. It had been stocked with unknown numbers and kinds of game fish, and mudcats in Tierra Blanca Creek had done their bit to load the lake with fish. The catches in June that year were phenomenal. On the opening day more than 5,000 bass were caught—some folks guessed 50,000! The fishing was too good to be true, and it didn't last.

Water started dropping in 1941, and continued until only a channel full of water remained. Then, all at once the rains came. Buffalo Lake, which

NOTE.—The author is regional biologist, Soil Conservation Service, Fort Worth, Tex.



Mike Green and W. B. Henderson proudly display 32 channel cat caught in Buffalo Lake.

many had predicted would never be full, soon was overflowing. The lake was restocked with game fish—but the mudcats got there first. The waters near the dam were black with tiny catfish. An estimated 11,000,000 of them were removed. Catfish fishermen protested, but still Buffalo Lake was overstocked. It became the habit of the drivers of fish-hatchery trucks to dump any surpluses they happened to have into the lake.

Creel, season, and size limits on fish, more restrictive than the State fishing laws, were removed. The Texas Game, Fish, and Oyster Commission then removed all limits from crappies in the lake. The following year seasonal limits on fishing were removed all over the State.

Except for catching mudcats and stunted crappies, fishermen were usually disappointed. There was no successful reproduction of bass, bluegills,

or channel cats in Buffalo Lake during those years. The number of fishermen visiting the lake declined. Every test showed serious overstocking. The old cry for more stocking went up.

In 1945 an effort was made in cooperation with the Texas commission to remove catfish and other rough fish by means of a large trammel net. Several thousand pounds were removed. Subsequent inspection showed that there were still too many catfish. In July 1946 the United States Fish and Wildlife Service provided a 175-foot seine and an expert seiner. With the help of hired labor—and almost too much voluntary labor—Buffalo Lake was seined for a period of 2 weeks.

More than 7,000 pounds of catfish were removed. Anyone willing to carry the fish away were welcome to them. Folks turned out by the hundred. With each haul of the seine 200 to 600 large mud-

cats were taken, and each time they quickly vanished into sacks, garbage pails, washtubs, or whatever container was at hand.

The seining operation showed that channel catfish had successfully spawned. And within a week inch-long bass, the first in many a year, appeared.

Homer S. Swingle the expert fisheries scientist of the Alabama Agricultural Experiment Station, inspected Buffalo Lake during the seining operation. It was his opinion that proper stocking of bass and bluegills might restore a balance of fish in the lake. In 1947 such stocking was made, using the numbers recommended for the acreage of water at that time.

Since 1945 Buffalo Lake has made continuous improvement—but not entirely due to seining and stocking. In 1947 the Panhandle Outdoor Sportsman's Club initiated a fishing rodeo. Large, tagged fish—with prizes on their heads—were released in the lake. There was a great flurry of

fishing. That year 47,253 fishermen fished there—an increase of 29,012 over 1945.

In 1948 the rodeo—and better fishing—attracted 70,459 fishermen. The 1949 rodeo—with such attractive prizes as a trip to Alaska, won by D. H. McCrary of Sanford, Tex.—started off with a record-breaking 21,659 fishermen in May. The heavy fishing is paying off in larger fish and better catches. It demonstrates that there's no such thing as overfishing Buffalo Lake, or perhaps any lake.

Each year since 1945 observations have been made on the reproduction of game fish—the key to “balanced” fish populations. And each year the condition has been satisfactory. The mudcat fishermen are not disappointed, either. There are still plenty of mudcats.

It isn't always easy to apply good fish-management principles to a large lake, especially after it once becomes overstocked. Buffalo Lake, however, shows that poor fishing lakes are not hopeless.

PASTURE ROTATIONS IN THE RICE BELT

By W. M. NIXON

ECONOMISTS say that when world conditions settle into something like normal, American farmers will have to grow rice more efficiently to stay in the market. They point out that there will be strong competition from countries where yields are high and labor costs low.

Farmers in the Louisiana and Texas rice belt are solving the problem that the economists foresee. They are getting much higher yields through the rotation of rice with legumes and grasses, a system that is part of the districts' coordinated conservation program. In this way, growers are also obtaining diversification, and greater income from livestock. Their cattle show amazing gains on improved pastures between rice crops.

Of course, it takes time for new methods to take hold. But it's easy to see the profit argument in this rotation system and district cooperators are fast adopting the new way.

Dr. W. B. Sturgis and R. K. Walker of the

Louisiana Agricultural Experiment Station developed this cropping system. They have several years of results to prove its value.

Their records show that as much as 293 pounds of beef per acre were produced from February 10 to November 15 on white clover, Kobe lespedeza, and Dallis and Bermuda grass pastures. This was a gain of 580 pounds of beef per animal. The pastures were seeded in 1942; the yields were figured in 1945. Four hundred pounds of 3-12-12 fertilizer were applied at seeding time.

Rice fertilized with 200 pounds per acre of 4-12-8 after 3 years of improved pasture yielded 19.2 barrels per acre, more than 3 times as much as the 6 barrels per acre on a similar field that had been left idle and unimproved for 3 years.

Adolph Daigle, a cooperator with the Acadia Soil Conservation District, harvested more than 20 barrels of rice an acre on his farm near Church Point, La. This yield was obtained on 60 acres of rice planted following improved pasture. The previous yield from the same acreage was 12 barrels per acre.

Three years ago, Daigle established white-clover pasture on part of this acreage and lespedeza pasture on the remainder. Two hundred pounds per acre of 20-percent phosphate were applied to a well-prepared bed before clover was seeded. The pastures furnished excellent grazing for Daigle's cattle.

NOTE.—The author is regional agronomist, Soil Conservation Service, Fort Worth, Tex.



Janel Mouton plucks clover blossom growing in mixture with oats. The oats and clover will occupy the land 2 years and will follow 1 year of rice.

In December 1947 the pastures were disked and harrowed twice, the legumes and grass being turned under so that decomposition could take place before the land was prepared for the rice crop in the spring. No fertilizer was applied to the rice at planting time.

Claude Egleson of Bell City, La., harvested 12 barrels per acre when he grew rice after a year of Kobe lespedeza and Bermuda grass pasture, as compared with 8 barrels on land not benefited by pasture improvement.

The Bertinot-Dugal farm near Opelousas, La., in the Grand Coteau Ridge Soil Conservation District used to grow rice 1 year and allow the land to lie idle 1 year. The rice yield ranged from 8½ to 12 barrels per acre.

Now the system is to grow white Dutch clover 2 years and rice 1 year. Grasses such as Bermuda grass, carpet grass, and barnyard grass volunteer in the clover. Rice production following the 2 years of improved pasture averages 17 barrels. One cut of 30 acres averaged 23 barrels in 1948.

The farm originally carried 60 mature cows with an average of 50 percent calf crop. The calves were weak and unhealthy, and many died. The cows were always poor in winter and needed

considerable feed to keep them alive.

The farm now carries 120 cows. In 1948 the calf crop was 90 percent and the calves were strong and healthy with no deaths that year. The cows kept fat all year with very small amounts of feed. In addition, several thousand dollars' worth of clover seed was harvested.

According to David E. Black, in charge of rotation investigations for the experiment station at Crowley, La., the improved pasture rotation usually increases rice yields about 25 percent and beef production about 600 percent.

CANAL LININGS TESTED

(Continued from page 82)

under conditions simulating use. Model testing is done at the River Laboratory where seepage and other factors associated with the performance of linings can be measured with some precision.

3. Field testing at selected sites to determine relative durability under specific site and climatic conditions.

After 1 year, all those who participated in the field test described are pleased and feel that the work is accomplishing its objectives. Construction details, including cost data, have been made available to all cooperators and each is privileged to inspect the installations at will and make his own interpretations concerning the performance of the various types of linings.

CONSERVATION AS SEEN FROM THE HIGHWAY

By H. H. FINNELL

IF LESS dust comes over to west Texas from New Mexico when the winds begin to whoop it up next spring, it will be largely because soil conservation districts have been getting results. At least, that's the way it looks from the highway.

I drove through Central Curry and Southwest Quay Districts last February, inspecting soil erosion conditions, and again in mid-July.

Thirty percent of the cultivated fields were bare and subject to wind action in February. In July, only 13 percent were bare. These are all being fallowed for wheat, and if the operators have luck with their fall seeding, virtually none of the wheatland area of these two districts will be exposed to blowing next spring.

The rest of the fields have crop cover coming on, or residues from crops already harvested, which if well managed will hold the land for the blow season of 1950.

To show how these farmers came through an unfavorable season, making gains against erosion hazards, I risk boring you by citing part of my data.

Not quite half of the 235 fields I inspected were in wheat last February. Eight percent had already been abandoned. Thirty-seven percent were uncertain, mainly because of thin stands, and 55 percent were promising. By sorghum-planting time the abandonment rose to 13 percent.

The wheat that remained turned out better than an average yield though fullness of ground cover could have been better. It has been better in years past. But New Mexico wheat farmers are not hesitant to turn to sorghums when needed to fill in. They did so this year.

You will see sorghums, both listed and drilled, throughout the community. Those depending on the summer crop outnumbered those depending on unprotected fallow $2\frac{1}{2}$ to 1.

My frank opinion is that the 6 percent of fields now gone to weeds may even become a worse hazard next spring than some of the clean fallow if they are turned under late and seeded to wheat over a depleted soil moisture supply.

Still the fact remains that if all the bad luck and bad practice there is room for in the present situation should take place, there will be less soil blowing there in 1950 than in the blow season just past.

A few fields have been planted to sorghums which might have been safely fallowed, using stubble-mulch methods. The general attitude of striving to be safe rather than taking a gambler's chances is much to be admired. Congratulations to eastern New Mexico!

This, you know, is an area generally classed as marginal. The average annual rainfall varies from 15.04 inches in the northwest part of the study area to 18.71 inches on the southeast.

One would be half inclined to say they farm better in a marginal territory than where seasons are surer and too many operators take chances for no other reason than that they feel they don't have to take precautions.

It's a nice thing, balancing land capability with farming methods. It's the thing that ought to be done everywhere. How does *your* conservation look from the highway?

REVIEWS

FRONT PORCH FARMER. By Channing Cope. Turner E. Smith & Co. Atlanta. 1949. 171 pp.

"Front Porch Farmer" is a book that should be read at one sitting—and preferably on *your* front porch, on a Sunday afternoon, where you can hear the birds chirping under the lawn sprinkler, listen to the song of the locust, and watch a pair of quail tripping sedately around the shrubbery. By doing it this way, you can get the real feel of the book—as if you actually were chatting with Channing Cope about taking "frustration, confusion, and drudgery" out of farming—making it a foolproof, weather-proof business, as he claims he has done.

First, there is an introduction by Louis Bromfield who describes Channing Cope's story as "exciting and stimulating, as the adventures of an explorer in a new world." "In fact," says Bromfield, "the system of farming that he has developed is a 'new world' as far as farming in the Cotton South is concerned."

NOTE.—The author is research specialist, Soil Conservation Service, Goodwell, Okla.

Then Cope takes over. He defines his objective: farming in such a fashion "as to hold most of the rain where it falls, where there is no soil loss, where the crops are planted not more than once in a decade, where expensive buildings are unnecessary, where the lands are being constantly improved, where the crops are a match for all the variations of the weather, where there is no drudgery, and where the animals gather the crops in the field." In his foreword he tells how he and a number of other self-styled "Front Porch Farmers" have attained this goal. He is a livestock farmer. To sustain his livestock, he uses kudzu, sericea lespedeza or Coastal Bermuda grass, Ladino clover, and Kentucky 31 fescue. These crops, in proper combination and rotation, provide grazing 365 days of the year.

The rest of the book is devoted to explaining this outline—chatting about it, raising and meeting your objectives, trying enthusiastically to persuade *you* to "go, thou, and do likewise." He warns you about this in the first part of the book, says that he is following the practice of the old Negro preacher who explained his preaching methods as follows: "First I tells 'em what I'm gonna tell 'em; den I tells 'em, and den I tells 'em what I told 'em."

This book is not a scientific treatise (Cope disclaims that at every turn), but his farming operations are based on the best scientific knowledge of agriculture that he can tap anywhere in the country. It is good to see the staff of the Soil Conservation Service mentioned by name frequently. That, incidentally, is one of the devices that makes this such a readable, personalized book. Channing Cope talks of this one and that one (from professional scientists to neighboring farmers), quoting their exact words, just as if he were in fact talking with you over the railing of his front porch.

Cope's foolproof, weatherproof farming was not attained without a good deal of the "sweat of his brow," even though it may sound easy in the telling. His Yellow River Farm was so poor and denuded when he acquired it that he was warned he would "perish to death" with it. It took 22 years to produce the system of farming that he tells about in his book, 22 years of experiments and trials. But his system is so abundantly successful that he cannot restrain his urge to get it spread to the farms of his neighbors, to the Yellow River watershed, to the entire South.

When you come to his last sentence, "Thanks for following us to the conclusion of the story of Yellow River Farm with the promise and the challenge that it offers," you'll probably feel like saying, "Thank *you*, Mr. Cope, it is a mighty good story."

—VERNA C. MOHAGEN.

In October, Soil Conservation Magazine presented condensed versions of several papers read at the Eighth Annual Conference on Conservation, Nutrition and Health. Beginning on this page are two more summaries of Conference papers of wide interest and importance.

WATERSHED MANAGEMENT PROBLEMS. (Ohio Conference.)—At no time have we attempted to face the problem of water control and use in its full sense, declared E. N. Munns, chief, Division of Forest Influences, United States Forest Service. We have approached the problem too much as an engineering one, not as a social problem, and certainly not as a land problem.

The water problem is to a large degree a land problem, Munns asserted. Proper land care means more abundant water, better stream flow, more ground water, and higher quality water. We in America have not yet learned that good land and good water go together. Why? Either our shortages have not been frequent or large enough, or our surpluses have not been damaging enough, or the relation of the problems to the condition and use of land is not yet sufficiently understood to produce the effort necessary to solve some of these problems. The engineer with his slide rule and concrete has been able to promise and deliver, while the land manager aped his works but did not boldly follow where his inner conscience would lead him.

Not all our water problems stem from land misuse, he conceded. But the short-sighted policies and indifference which have characterized our attitudes toward the land as a permanent and continuous source of wealth have contributed heavily.

Hopeful is the increasing weight being given to the watershed aspects of river-basin planning. The public, as well as some engineering authorities themselves, are at last accepting the long-held views of conservationists that the land must be included, along with the rivers, if our waters are to be controlled and put to use on a lasting basis. There is no longer the same indulgence towards partial planning which omits the consideration of the watershed aspects.

The watershed management concept, applied in its full sense, offers the most desirable medium for interrelating the interests of land, water, and people, the speaker stated. Although commonly defined in terms of water relations, watershed management necessarily encompasses all human activities on drainage areas because in one way or another, all these activities affect some phase of water use, behavior, or condition. Without specifically considering these human activities and their various effects, we cannot hope to achieve an optimum condition of soil stability or of water flow. Without adequately taking them into account, we shall not be able successfully to cope with floods, water shortages, or the depletion of soil and cover which so greatly accentuates these water problems.

Many of us forget or fail to recognize that land is a complex of many factors. The art and practice of watershed management require more than a mere working knowledge of the interacting effects of climate, physiography, soils, vegetation, and human use upon water behavior. Indeed, too many technicians engrossed in the details of rainfall, crops, or soils tend to lose sight of the significance of these interrelations, if they ever really recognized them.

The soil is more than a convenient medium for crop production. The rain which is absorbed and not needed by plants or evaporated, is held in this vast natural reservoir for later release to surface or underground sources.

If the soil is not in good condition to absorb this precipitation, its reservoir capacity remains to a greater or less degree, unused. In this way, many benefits may be greatly reduced or lost altogether as surface runoff. Further, this same runoff may wash away large quantities of the rich upper soil, depleting the capacity of our soil reservoir, and reducing its ability to store moisture either for usable supplies downstream, or for plant growth. These same soil and water losses create or add to the harassment of valley communities by floods and sediment.

The vegetative cover, itself a product of soil and climate and man's modifying activities, in turn greatly affects the hydrologic properties of the soil, and indeed the functioning of the whole water cycle.

The type and density of vegetation, including its crown and root systems and its litter, influence the amount of precipitation intercepted and returned to the atmosphere, the water absorptive properties of the soil, the amount and rates of soil moisture extracted, the proportion of surface runoff to total water yield, and the rates of soil losses.

The effects of cover in the winter are no less marked than in the summer. At the Fraser Experimental Forest in Colorado dense young pine stands intercepted and evaporated sufficient snow as to lose to the air about 8.5 percent more water than an open field. The bare open crowns of an aspen stand, on the other hand, not only permitted much snow to reach the ground, but its stems also provided enough protection against sun and wind to increase water storage by 12.5 percent over that in the open field. In summer, the Fraser work shows that the amount of rainfall reaching the ground can be increased. By thinning stands of pine and spruce, up to 61 percent more water reached the ground than in dense stands.

Munns spoke out for the adoption of a national land and water policy which definitely recognizes that the public interest in watershed values is paramount to the interests of individual land owners and operators, or other special groups.

There is a pressing need, said Munns, to build up an attitude towards the soil and its water relations which transcends the market place. This attitude should be reflected in a land and water policy which gives priority to the national security and welfare. It should be reflected in programs of conservation and education which stress individual responsibilities commensurate with individual rights in the ownership or use of the land, or in the enjoyment of its fruits.

IRRIGATION'S ROLE. (Ohio Conference.)—The spread of irrigation into what have heretofore been considered humid sections of the United States is proof that climatic conditions are generally variable with respect to reliable rainfall, declared Allan McCulloch, irrigation expert from Denver, Colo. More and more, it is becoming necessary to furnish additional moisture by irrigation to insure continued high crop production.

Several studies have been made recently, he said, which analyze the occurrence of extended drought periods in humid sections. These studies have brought out the value of irrigation as a means of crop insurance.

Different crops require different quantities of soil moisture to produce satisfactory yields, the speaker pointed

out. These requirements vary not only by crop, but by stage of development of the crop, and further vary according to the yield level.

Recently, more attention is being given to the level of moisture maintained in the soil to keep crops developing at a maximum rate, and to obtain maximum yields. Also interrelated is the fertilizer level of various soils and the quantities of commercial fertilizer added to the soil.

In the older irrigated sections of the United States it has been found that more and more attention must be given to the physical characteristics of irrigated soils, especially in regard to their ability to take in and retain soil moisture for plant use. These same factors are extremely important in planning irrigation in humid regions.

McCulloch cited several studies in which moisture-deficient periods have been analyzed to bring out the value of irrigation as a crop-insurance measure in humid regions. He added that a number of soil conservation districts are finding that irrigation is assuming an increasingly important role in establishing soil-building and soil protection for crops.

Several factors are involved in planning irrigation programs for humid regions, McCulloch pointed out. These include water supply, irrigation water requirements, irrigation system capacity requirements, and time and interval of irrigation.

Irrigation in those parts of the United States where there is a reasonable amount of rainfall is a new development which holds great promise of insuring a high level of yield by making water always available to the plant whenever it may be needed, whether it has rained recently or not.

SMOOTHING OUT THE RICE FIELDS

(Continued from page 79)

to the soil and otherwise maintain or increase productivity. It makes cultivation easier and reduces irrigation costs.

There are five steps in the leveling operation:

(1) The old rice field levees are plowed up; (2) the mounds or knolls are cut away by bulldozer; (3) the field is plowed in the customary way; (4) a small, 30-foot land-leveling machine is pulled over the field at least three times; (5) a big, 60-foot land-leveling machine is pulled over the field, twice usually being enough.

Made of a long metal frame with an adjustable blade in the middle, the land-leveling machine scrapes off the dirt from high spots and drops it in low ones as it is pulled back and forth across the field.

NORTHEAST

GOOD SOIL GONE WRONG.—About 8 years ago a fine old stone barn on a tenant-operated farm near Edgemont, just west of Philadelphia, was destroyed by fire. Only the side walls were left standing.

The farm recently was acquired by Adrain Teaf, a Philadelphia insurance man. Prior to rebuilding one wing



Good soil gone wrong.

of the barn, Teaf started to clear away a section to expose the concrete floor. He found he had to dig through an average of 1½ feet of soil to find the floor. Several "test holes" produced the same result.

Teaf discovered that this soil had washed out of an adjoining hillside field that had been "corned" up and down hill during the last 8 years. Several gullies that had been partially plugged told the rest of the story. The soil washed out of the field not only had been deposited rather evenly over the concrete floor of the 180-foot barn, but had buried an access road leading to the barn. Grass was growing atop the erosion-covered road, indicating that pretty fair topsoil had left the cropland.

Teaf now has the offending field laid out in contour strips, and is healing it with ryegrass.

STUBBORN FIELD.—For four generations members of the Easterbrook family unsuccessfully tried to clear and get some use out of a 20-acre field back of their barn. Then SCS engineers working with the South Worcester (Mass.) District came along and lined up a drainage system, helped Harold Easterbrook get needed equipment, and supervised the work. Not all this installation has been completed, but at least half of the field has been plowed and seeded and the rest of it will be in production before long.

GREEN PASTURES.—Arthur Leland and sons, farmers at East Bridgewater, Mass., had been bothered for years because they could get only poor grass from a 10-acre field. It was too wet for any kind of production. Technicians in the Plymouth District laid out a drainage system and a land-clearing program. A shallow ditch, parabolic type, did the job. The Lelands got "a wonderful crop" of clover and timothy. Other conservation installations gave the Lelands "very good pasture," so good that they became one of the three Green Pastures contest winners in Massachusetts in 1948.

SOUTHEAST

SOMETHING ADDED.—Three banks of Monroe County in Conecuh River Soil Conservation District, Ala., have added seven questions to the list used by their representatives when discussing loans with farmers. These banks are the Monroe County Bank and the First National Bank of Monroeville, and the Peoples' Exchange Bank of Frisco City. J. B. Barnett, Jr., cashier of the Monroe County

Bank, decided to include the following questions after studying soil and water conservation in the field with Sam Williams and B. D. Ledbetter, of the Soil Conservation Service:

How many acres of crotalaria do you have on your farm?

How many acres of improved pasture?

When was the pasture last fertilized?

How many acres of cover crops did you plant last fall?

Is your farm properly terraced and do you keep up these terraces?

Do you have a district soil conservation plan?

Are you carrying the plan out?

CIVITAN AWARD.—John M. Brown, work unit conservationist at Marietta, Ga., was presented with an honor key and wall plaque, one of the four Civitan International awards at the International Civitan convention held this year in Washington, D. C.

HEADS SOCIETY.—John T. Bregger is being congratulated on his election as president of the American Pomological Society at its recent meeting in Yakima, Wash. Bregger is project supervisor with the Soil Conservation Service at Clemson, S. C.

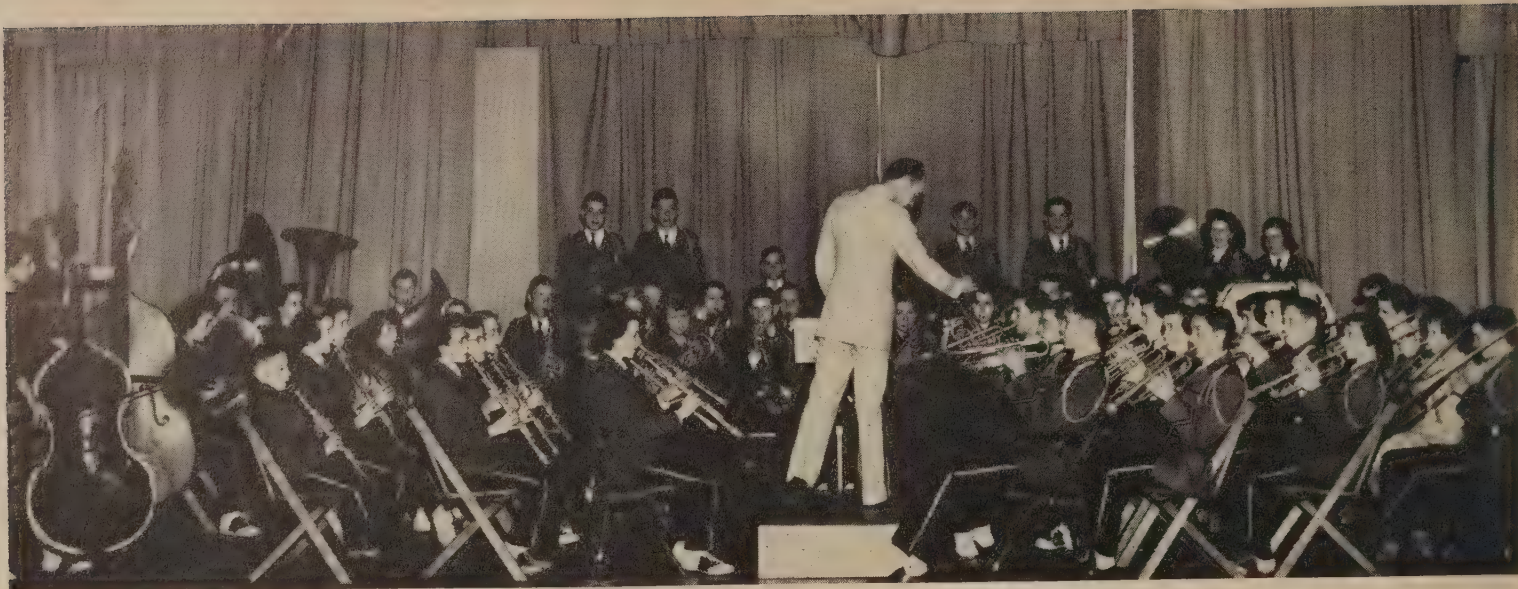
DIDN'T LOSE A HATFUL.—Farmers in the Taylor County (Ky.) Soil Conservation District are becoming more interested in terraces as they see how they control runoff water during heavy rains, supervisors report. Debs Pike says he "didn't lose a hatful of soil or a gallon of water" from a rolling field he terraced and planted to corn in 1948.

UPPER MISSISSIPPI



OPEN-AIR CLASSROOM.—The vocational agriculture class at Mount Ayr, Iowa, has secured a 5-year lease on a 40-acre tract of land on the highway near Mount Ayr. With the assistance of SCS technicians and the soil conservation district, this class is setting up a series of test plots on various fields and crops, and planning to carry out conservation measures suitable to the area around Mount Ayr.

TEACHING PROP.—The Montcalm Soil Conservation District is the seventh district in Michigan to construct a set of soil-loss plots for demonstrational and educational purposes. The plots were financed by the county governing body and were constructed and will be serviced by the local Vo-Ag and Veterans' Institute.



Robert W. Dowling leads high school band in playing "Erosion."

APPEAL TO THE EAR.—Robert W. Dowling, music supervisor of the Bremen Schools in Fairfield County, Ohio, wrote an original composition called "Erosion" for the high school band to play at the annual music fair. He dedicated it to "those many farmers who are following good soil conservation practices."

The composer described the number as follows: "'Erosion' was written as a descriptive piece for concert band. The work is powerful in descriptive matter and is intended as a jolt to make us mindful of the destructive forces of soil erosion. The composition starts with an introduction of quiet rainfall, done in the clarinets, and progresses through the mournful night-long rains, done in the baritones.

"Summer afternoon showers are depicted by the melodic theme of the trumpets.

"Finally, huge masses of the earth's best soil are brutally rushed downstream by the chromatic passages of the full band. Destruction of the earth's surface is pictured in the coarse blasting of trombones, baritones, and basses as the deluge comes to its powerful end."

Dowling once played the bass fiddle for Paul Whiteman.

With the advent of "Erosion," music now takes its place alongside the artist's brush, the spoken word, the drama, and all other known means of telling the erosion story and the compelling need for soil conservation.

It may reach a segment of society hitherto unreached, or it may simply fortify and further drive home the story to those already informed.

This example of what a music supervisor has done clearly demonstrates that soil conservation can be injected into all courses of study, including the arts, sciences, spelling, and even physical education. It is probably more effectively taught this way than through a special course of study.

Paul Cummins, Fairfield County school superintendent, is very much interested in soil conservation work. Among other things, he helped the district conservationist make a recording for broadcast over a number of radio stations. The recording is useful in explaining to other school officials how teachers can make soil conservation an interesting subject.

—PEARL FOGLE.

MINNESOTA MOVIE.—Supervisors of the East Agassiz (Minn.) Soil Conservation District have shown particular interest in getting out needed information to the public. They have hired a commercial photographer to make a kodachrome 16-mm. film showing soil-mapping, ditch-surveying, and the operations of a tree-planting machine.

DANGER SPOTS SERVED FIRST.—The Manistee (Mich.) Soil Conservation District has developed a new procedure for handling applications in the district. A priority system based on rate of soil decline is being used. The district will give top priority to *natural neighborhood groups in high-erosion-hazard areas*. This is making good use of conservation-needs information that was developed several years ago.



REFORESTATION PROJECT.—The Grand Haven, Mich., Kiwanis Club has inaugurated a soil conservation program and has purchased 80 acres of land for reforestation purposes. During the tree-planting season the club held a twilight meeting on their property and members, wives, and children planted 6,000 trees during the evening.

GRASS FARM.—The Audubon County (Iowa) Soil Conservation District has done extensive work on the Elmer Carlson farm. This farm was planned to be established primarily in grasses and forage production due to the fact that much of the land falls in Classes IV, VI, and VII capability. This project is intended as a practical demon-

stration of what can be done on this type of problem area, as many acres of this kind are found in southeast Audubon County.

WRITING CONTEST.—The Decatur (Ill.) Chapter of Friends of the Land recently sponsored an essay contest which drew 55 high school entries and 142 grade school entries. Prizes totaling \$150 were furnished by local banks.

ATTENTION TO OLD APPLICANTS.—The supervisors in the Noble County (Ind.) Soil Conservation District recently called a meeting of all the old applicants to determine how many were still interested in developing farm plans. Forty farmers attended and five others called at the district office the next day to signify their interest. These 45 farmers were assigned to 6 groups and work has been started on 2 of the groups. Farm conservation plans were developed this summer. This method is used to clean up old application lists.

MILLIONS OF TREES.—Four and one-half million trees were planted by district cooperators in Michigan during the spring planting season. Two and one-half million were furnished by the Soil Conservation Service, approximately 1,000,000 came from district nurseries, and the third million came from State and Federal nurseries. The planners' estimate was that there was a need for 9,000,000 trees for planting this past spring.

To make more trees available, the West Ottawa directors have sponsored a program whereby individuals produce their own planting stocks in farm seedbeds. One hundred forty-three such seedbeds have been started in the district and it is expected that each will soon produce from 1,000 to 10,000 plantable trees. In addition, the West Ottawa District sowed sufficient seed in the district nursery to have 800,000 to 1,000,000 trees available in 2 to 3 years.

WESTERN GULF

THEY KNEW GRASSES.—Fifty-three boys averaged 229 points out of a possible 300 in a grass-judging contest held last June 30 in connection with a wool and mohair show at Sonora, Tex.

Three boys tied with perfect scores and two tied with 296 points each in identifying and describing 30 plants in not more than 1 minute each. The ties were run off with 10 more difficult plants. Two boys tied in the run-off and they judged a third group of 4 exceedingly difficult plants.

Fourteen teams of 3 boys each averaged 688 points a team out of a possible 900.

Contestants were members of 4-H or FFA. The contest was sponsored by the supervisors of the Edwards Plateau Soil Conservation District, the Sonora Wool & Mohair Co., and Sonora Lions Club. Eight individual prizes ranged from \$15 to \$1. Four team prizes ranged from \$15 to \$5.

—E. B. KENG.

RECORD SET.—Cooperators with Rogers County Soil Conservation District, in northeast Oklahoma, built 81 miles of terraces and 13 miles of diversion ditches last year. This equaled the total amount of terraces built in all the years prior to establishment of the district in 1943.

Farmers, with assistance of SCS technicians, built 340 miles of terraces and 39 miles of diversions up to December 31, 1948. Oliver Downs, SCS engineering aid, and his assistant, Billie Hutcheson, were busy all spring running terrace lines and diversion ditches and staking ponds. District farmers this year expect to equal or exceed the record for terrace construction set last year.

BONDS OFFERED.—The Willbarger-Wichita (Tex.) and Cotton (Okla.) Soil Conservation Districts, are offering \$25 to \$100 prizes in United States Savings Bonds for accomplishments in soil conservation during 1949. Cooperating with the districts are chambers of commerce, banks, and various organizations.

Aims are to stimulate the application of coordinated conservation programs to the land, and to call attention to the operations of soil conservation districts.

VETCH STOPS EROSION, TOO.—The war-famed jeep, known for its rugged ability to keep going under all conditions, has met its match on the farm. Vetch did it.

L. L. Bair of Garland, Tex., was cutting oats and vetch for hay. The contractor baling the hay was using a jeep for part of the operations. The jeep worked well for a couple of hours then began to slow down. When the contractor left in it for lunch, it stopped on the highway.

Shifted into four-wheel drive, it still wouldn't move. Investigation showed that 3-foot-long vetch runners had entwined around the driveshaft in such a thick coil that the shaft couldn't turn.

The contractor has since shown profound respect for vetch.

—HUEY WHITEHURST.

SOUTHWEST

A NOTE ON LOVEGRASS.—Weeping lovegrass, a drought-resistant plant from Africa, now does double duty in Roosevelt County, according to Herb Cavett, Portales, N. Mex., SCS man in this area.

After experiments for the last 10 years, weeping lovegrass now is proving its value in protecting eroding fields and providing excellent forage, Cavett says.

Until this year, only a few farmers and ranchers had been successful in establishing good stands of this grass. The story is different now. Ample moisture has resulted in good stands where the grass was planted in furrows. It now appears, Cavett says, that broadcast planting, either in fields or on native pastures, is a failure.

An excellent example of the successful seeding of weeping lovegrass is to be found on the farm of K. A. Flatt, 6 miles southeast of Portales. Flatt, who is in the Roosevelt Soil Conservation District, recently harvested a 13-acre field planted a year ago and obtained enough seed to plant 300 acres, which he plans to do.

Flatt deep-listed this 13-acre field early in June 1948. A few days later he chiseled the furrows. The ridges were split back to kill weeds on June 17, and seed then was broadcast over the ridges from the back of a pick-up truck. Cavett, who assisted Flatt in working out his conservation plan, estimates that less than 5 percent of the seed falling on the ridges came on, while an almost perfect stand was obtained in the furrows.

Flatt says he had good luck with this planting. Two days after the field was seeded, a heavy rain fell, so heavy in fact that a lot of the seed floated away. However, enough lodged in the furrows to provide a good stand.

Cavett points out that there are more than 3,000,000 weeping lovegrass seed in a pound. As little as 1 pound of seed to the acre, properly planted, would be more than could develop into growing plants, but this is probably as little as it is economical to use, the conservationist says. Flatt mixed his seed with sand and sifted it by hand from the back of his pick-up truck.

The carrying capacity of weeping lovegrass is at least twice as much as the common range grasses, and some farmers believe it is even higher, Cavett says.

The common rule in this area is to provide 32 acres of range grass to the cow. Lovegrass will take care of a cow on 16 acres, and B. M. Schumpert, another farmer in this area, believes that a good stand, with plenty of moisture, will take care of a cow on only 2 acres. Schumpert reports that he pastures 75 cows on 125 acres, and the animals couldn't keep up with the growth during the summer.

Flatt says that the land upon which he obtained such a good stand of lovegrass had been damaged by wind erosion to the extent that it wouldn't have been profitable to cultivate it for any other crop. He feels that this land now is being used for its best productive purpose—grass.

THIS FIELD WAS THIRSTY.—Water diverted from roadside ditches is enabling A. M. Towner to produce more than enough feed for 53 head of hogs on 6 acres of alfalfa.

Towner's farm is in the Central Curry Soil Conservation District, near Albuquerque, N. Mex. After terracing a 20-acre field about 7 years ago, he found that he could flood-irrigate about half of it by diverting runoff water from the roadside ditches.

Part of the field was heavily infested with blueweed, but Towner planted 6 acres to alfalfa anyway. This year he has been grazing his 53 hogs on the alfalfa tract and finds that he has feed to spare.

With the assistance of SCS technicians, Towner now plans to rebuild his terraces and make them higher and stronger. He also plans to double his alfalfa acreage.

DISTRICT OWNS TEST FARM.—The Mosca-Hooper Soil Conservation District in Alamosa County, Colo., is the only one in the State and probably one of the few in the entire country to own its own experimental farm.

When the Mosca-Hooper District was organized in 1943, farm machinery was scarce and the supervisors realized that they had many problems to solve, according to L. B. Casselman, secretary of the district and president of the Colorado Association of Soil Conservation Districts.

"We eventually bought and paid for all of our machinery, but we realized that we needed to know a lot more about conservation practices suited to this area," Casselman said. "That is why we purchased 80 acres of land 4 miles northeast of Mosca in March 1948."

At the time of the purchase all of the land was in brush. The land now has been cleared, part of it is being leveled, a large irrigation ditch is being constructed, and a complete conservation plan is being worked out with the assistance of SCS technicians.

In order to acquaint farmers over a wide area with the work to be done on the experimental farm, a field demonstration was held last July with various types of farm machinery being demonstrated.

The 80 acres are to be planted to different varieties of alfalfa and pasture grasses. Different plots are to be handled differently, some to be fertilized and some not.

In this manner, actual practices that can be applied on farms in the area can be worked out, Casselman says. Actual expense records are to be kept in the area to determine whether the practices are too expensive to be practiced or if they are successful.

After the farm has been placed in operation, it is the plan of the district supervisors to allow 4-H Club members to use certain parts for farming purposes so experiments can be carried out.

PACIFIC

A VERY SPECIAL SHEEPSKIN.—A milestone in the advancement of conservation education in western agriculture was reached this summer at Oregon State College with the graduation of the first student to complete the soil and water option under the agricultural engineering curriculum.

The graduate was Ivan A. Custer, now employed with the Soil Conservation Service at Richland, Oreg. Custer received a B. S. degree from Harvard in connection with his naval training, but transferred to OSC following his release from the Navy.

The revised curriculum leads to the degree of Bachelor of Science in agricultural engineering granted by the school of engineering. Under this curriculum, it is necessary for a student to decide at the beginning of his junior year which of the three options he wishes to specialize in, namely, soil and water, power and machinery, or farm structures.

Included in the agricultural engineering course work are classes in the basic sciences of engineering and, in addition, such advanced civil engineering courses as structural analysis, reinforced concrete, hydraulics, and hydraulic machinery. In addition to these pertinent engineering courses, the student receives special instruction in soils, soil conservation engineering, irrigation engineering, etc. Prior to submitting the new agricultural engineering curriculum to the college authorities for approval, it was thoroughly discussed with engineers of the Soil Conservation Service and the Bureau of Reclamation, and their suggestions and recommendations were incorporated.



December 1949

Soil Conservation

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

SOIL CONSERVATION •

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☆ THIS MONTH ☆

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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STEERS GAIN ON FESCUE.—Fifteen steers were put on a 10-acre field of Suiter's grass (Kentucky 31 fescue) and white clover at Fort Pillow (Tenn.) Penal Farm. Before going into this field the average weight of the steers was 580 pounds each. All they had to eat from November 1948 was the fescue, white clover, and a salt block. Water was hauled to the watering trough each day. In January 1949 the steers were reweighed and the average weight was 651 pounds, a gain of 71 pounds each in 66 days on this pasture.



December 1949

FRONT COVER.—It won't be long now before the snow starts piling up in the mountains, storing the moisture on which thousands of farmers rely for profitable yields. Methodical measurements are made by SCS technicians, on which are based estimates of moisture that will be available during the growing season. In December 1939, in July 1941, and on other occasions SOIL CONSERVATION Magazine has printed articles dealing with snow surveys and runoff forecasts based on such surveys. This month's cover shows the weighing of a snow-sampling tube (filled with snow) to determine water content. It was taken on the Baker Creek Snow Course, White Pine County, Nev. The photographer was Robert H. Branstead.

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SPEEDING SCIENCE TO THE FARM

By WILLIAM L. SOUTHWORTH



How much irrigation water can be applied to sloping fields without danger of erosion? Seeking the answer here are Karl O. Kohler (holding pail) and S. O. Stamm, regional engineer and technician of SCS, respectively. This picture was made during the "learn by doing" conference at Redmond, Oreg., last summer.

THE BENEFITS of current scientific findings are getting to Pacific coast irrigation farmers more quickly as a result of a unique partnership between SCS forces engaged in research and those assigned to soil conservation districts.

Over the past few years, this close teamwork has paid off handsomely in speeding the adoption of better methods of handling irrigation water. It has also heavily emphasized the value of solid scientific backing for recommendations. Trial and error methods in irrigated sections of the far West are rapidly becoming a thing of the past as technicians and farmers come to rely on facts provided

by research and the application of research findings in the field.

The new partnership may have been born of impatience. Over a period of many years, first under the leadership of W. W. McLaughlin and later under George D. Clyde, SCS irrigation research had accumulated a large store of information concerning the conservation of soil and water on irrigated lands. In this body of information were the answers to many of the most pressing irrigation problems. Research workers knew, for example, that too much irrigation water applied to sloping land caused erosion, waterlogging, leaching, and in some instances, destructive alkali conditions. Through long study, they also had discovered

NOTE.—The writer is information specialist, Soil Conservation Service, Portland, Oreg.

why some soils were able to absorb and hold larger quantities of water than others and how to put the right amount of water into the soil to benefit crops of various kinds growing under various conditions. They possessed a rich fund of data vital to the maintenance of a permanent irrigated agriculture in many parts of the West. The challenge was to get this knowledge out to the farms.

Over a period of years, improved irrigation practices resulting from research had gradually found their way into use on a considerable number of farms. But the adoption of conservation methods was not sufficiently widespread, nor were SCS scientists satisfied with the speed with which farmers took to improved methods. It was this lag between research and application that made them impatient.

In the early days of soil conservation an SCS demonstration project was set up on 40,000 acres of irrigated land in the Kittitas Valley of Washington. Technicians worked with farmers to devise methods to reduce serious erosion losses on sloping lands and to increase the efficiency of water application, which in many instances was less than 35 percent of the water applied.

Field trials and the application of research findings were projected into farm irrigation operations for the first time.

Farmers were immediately interested. After they understood the movement of irrigation water to the plant-root zones and the amount of water the plants actually required to sustain production, they began to revise their irrigation systems and water-application methods with the purpose of achieving "conservation irrigation." Results showed that they were saving money, labor, and water and were getting a more uniform production and it was strikingly apparent that they were making a major reduction in the amount of soil washed into waste ditches and onto county roads.

From this original project the practices and methods were carried out to CCC camp areas and, later, to the newly formed soil conservation districts.

As conservation gradually spread to more and more irrigated areas in the Pacific region, it became apparent that if the tempo was to be speeded up it was important to devise an organized procedure for training SCS technicians so that they, in turn, could train farmers.

Shortly after the end of the war, Wayne D. Criddle, now in charge of the Boise, Idaho, re-

search center, hit on a novel idea. The previous year he had been requested to assist the technicians at Ashton, Idaho, in determining the proper length of run and the amount of water to apply on a local shallow-soil problem area. After making the field tests and setting up recommendations for an irrigation guide, he began to wonder, "Why not take the findings of research directly to Service technicians and fit them to the conditions in the localities in which the technicians were working?" Here would be a way to put research findings to work in a rapid and effective manner.

Criddle, after securing support and encouragement from George Clyde, chief of irrigation and water conservation research, laid his idea before Regional Conservator J. H. Christ and Karl O. Kohler, regional engineer. Christ and Kohler were enthusiastic. They promptly called a small group of technicians working in irrigated sections together for a "skull" session with Criddle. The first meeting at Pocatello, Idaho, in March 1946, was a preirrigation-season meeting to acquaint field personnel with the proposals and to establish a basis for an "on the farm" training conference. The research scientists began by explaining the basic principles of applying irrigation water to the soil and the research findings on water requirements, rate of water application, and methods of application. The technicians were shown how to compute the water intake rates on fields of varying slope, soil depth, and type. At the same time, methods for determining the amount of waste water and the degree of erosion damage were explained along with ways for determining how much of the water applied actually benefited the growing crops. The operations personnel explained the place of irrigation guides in the planning and application of conservation irrigation and how the research findings would be used to substantiate and supplement the guide. Finally, the plans for the field conference were explained.

The following summer the first field-irrigation conference was called at Jerome, Idaho. It was divided into two parts. The first day, with an evening session, was spent discussing procedures. The second morning was spent in the field on irrigation trials for technician training. For field work the men were divided into small groups and each group irrigated a part of a farmer's field, carefully recorded the results, and then reported findings to the conference. Recommendations

were developed for the irrigation guide, then in preparation for that area. The second afternoon was used to show a large group of local farmers the safest and most efficient method of irrigating their crops under similar field conditions.

At the end of the first full-scale conference of technicians and research workers, both groups were pleased. The technicians left with a new fund of knowledge and a technique for obtaining additional information that could be put to use immediately on return to the soil conservation districts. They had new confidence in the recommendations they would make on conservation irrigation. The research people, too, were confident. They knew they had taken the first step toward bridging the gap between research and the application of research findings.

The idea of linking research more directly to work on the land took root quickly. The first meeting was followed in 1947 by similar meetings. The sound value of the arrangement, however, began to appear in 1949.

With facts obtained from their sessions with Criddle and his staff, technicians assigned to the Gooding, Wood River, and North Side Soil Conservation Districts in southern Idaho suggested that the district supervisors sponsor demonstrations of improved irrigation methods. The technicians volunteered to conduct tests and experiments in front of visiting farmers in much the same manner as Criddle and his staff had done in sessions with them. The suggestion met with instant appeal.

Late in June of '49 some 100 farmers turned out for a field day at Gooding, Idaho, sponsored jointly by the Gooding and Wood River Districts. The nearby North Side Soil Conservation District held a similar demonstration a few weeks later for a large group of veterans. Criddle or members of his staff were on hand at both gatherings to help technicians with explanations of research findings and to make computations of soil and water losses under different irrigating conditions. Similar conferences were held this year at Yerington, Nev., and Weiser, Idaho. Training conferences were held in Salt Lake City, Utah, and last year in Scottsbluff, Nebr., and Glendive, Mont.

Key to the success of the novel working arrangement is the manner in which the results of research are presented to technicians. Insofar as possible, experimental work is duplicated in front of them.

Later, the operations people themselves carry out similar experiments under the watchful eye of the scientists.

A typical meeting of research and operations personnel was held at Redmond, Oreg., last July. It was conducted jointly by Sterling Davis of Criddle's staff, and Dell G. Shockley, assistant regional engineer. Thirty technicians from irrigated sections of Oregon assembled in the Redmond High School for classroom discussion on fundamentals and explanation of the techniques used in irrigation research. Later in the day, all of the points discussed were demonstrated in the field.

At the close of the first day's session, the group was divided into five teams consisting of six men each. Cooperating farmers in the Mid-State Soil Conservation District had previously set aside parts of fields on which each team would conduct experimental work similar to that of the first day's meeting.

Early next morning each team went to an assigned location. The first problem was to ascertain the moisture content of the soil and determine whether irrigation was necessary and, if so, how much water should be applied. Procedures were provided by Davis and Shockley. Next, exact measurements were made of the slope of each field, depth of topsoil, and length of irrigation furrows, and determinations were made of type of topsoil involved and kind of material lying underneath.

At Redmond each team of technicians was assigned four furrows to irrigate and study. At the top of each furrow, holes large enough to contain a 3-gallon bucket were dug in advance of irrigation so the water going into each furrow could be measured volumetrically with the use of a stop watch. Similar holes were dug in each furrow at one-fourth and three-fourths the distance down the slope. At the same time, cross sections were made of each furrow so that accurate measurements could be made later of erosion damage.

In the first furrow, a large head of water was released in a deliberate attempt to cause erosion. A lesser volume was turned into the second and third furrows and a small head turned into the fourth. Members of each team kept careful records on the rate at which each stream of water advanced down the furrows and, with buckets, periodically measured the flow past each station in the four furrows.

(Continued on page 103)

WINTER PLANNING WITH A STEREOSCOPE

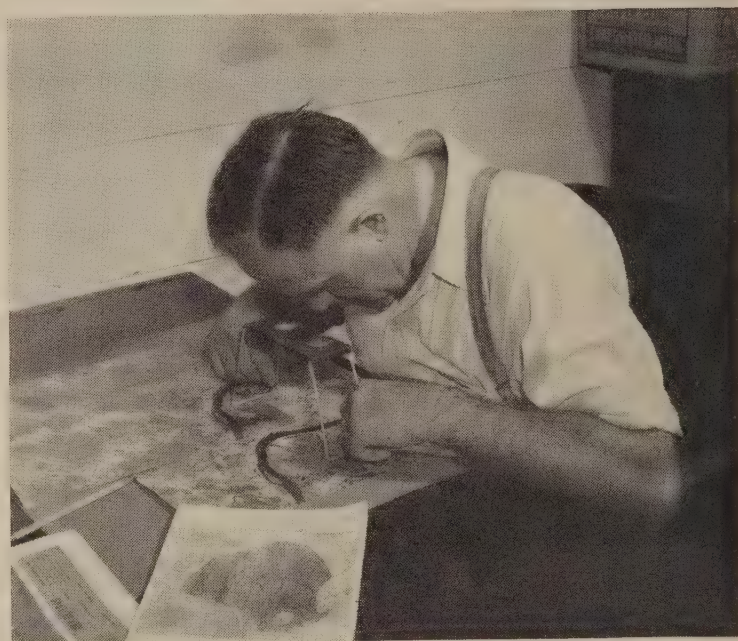
By AUSTIN L. PATRICK

EXPERIMENTAL WORK done in winter "off-farm" planning by three western Massachusetts soil conservation districts is suggesting a way to develop more and better conservation farmers, to speed up complete farm planning by making more effective use of farmers' and planners' time, to reduce backlogs of applications for plans, and to develop more interested and efficient district governing bodies.

This system does not relegate farm planning to a routine, nor eliminate professional skill, and it can be applied without upsetting established procedures. The only variation is the transfer of planning to months when farmers and technicians and district supervisors have more time to get the work done. It overcomes an objection to most other "off-farm" planning proposals because it reduces the generalities in planning talk by focusing each farmer's attention on his own particular erosion problems.

The system, devised under the leadership of Dr. Benjamin Isgur, district conservationist at Northampton, Mass., had two trial runs in Franklin, Hampshire, and Berkshire Counties last winter, first with a small group of veterans, and next, after some modifications, with another group of farmers. Results were highly satisfactory in both groups; 17 of the 20 farmers accepted complete farm plans.

The program starts with the district supervisors and requires their complete willingness to assume full responsibilities in their positions of leadership. They begin after the full harvest season rush by inviting carefully selected farmers to have their farms planned at a winter meeting through use of a new system in which their cooperation will be helpful. The surveyor is supplied with the names of the farmers who accept. As few as 6 and as many as 14 have been handled at one time. A survey is made of each farm before the planning meeting is to be held. This gives the planner time to make and color the land-capability map and become acquainted with the farm, which he will not see before the plan is made.



Paul Beardsley, farm manager at Groton, Mass., working at winter-planning with stereoscope.

The meeting is held in a public building where desks or tables are available. The session opens with a short nontechnical discussion of the program for the meeting and the use of stereoscopes. Each farmer receives a land-capability map for his farm, and a movie, "Know Your Land," is shown. It has been noted that most farmers quickly look at their own farm maps to see if some of the information obtained from the film can be used there. Next comes a showing of slides illustrating conservation practices favored on district farms. These are tied in with the land capabilities in the local area.

The farmer is then ready to get down to work with a technician, one being present for each farmer. On the desk are stereoscopic maps and a stereoscope. Farmer and technician start with the farm-organization sheet. This and the conservation survey provide the complete background for the planning. The farmer has the land-capability map, the farm-organization sheet, a plain photographic map of his farm, and the stereoscopic equipment. The planner has his technical guide. Together they study the situation and its problems and develop the complete conservation farm plan, with the understanding that it will be rechecked by the planner and farmer in the

NOTE.—The author is regional conservator, Soil Conservation Service, Upper Darby, Pa.

fields when spring comes. The meeting usually sees the farmer's acceptance of the plan and an agreement on the date when the planner will visit the farm to do the rechecking and start initial practices.

Dr. Isgur has found that slight modifications are necessary here and there before the plan will be ready for another trial this winter. The main change is that all the interested farmers will be called together for a general meeting. At that time appointments will be made with the technicians for individual office visits so that the farmer and technician can have all the time they need for planning.

Besides utilizing winter months more advantageously, there are other benefits. For example—

Technicians have 25 to 35 percent additional time to spend in the field with other farmers.

Travel time of the technician is saved because in one visit to the farm he can recheck the plan and start the farmer on one or more practices.

Keener farmer interest is developed because there is more time to discuss all his operation problems rather than just the one or two that may be plaguing him most when he is the busiest.

The farmer becomes a better conservationist because he has the opportunity to see and study slides and other materials, which he could not see or use when planning is being done in the fields at his farm.

Field planning (rechecking) is reduced because the farmer and the planner have an understanding of just what is involved. This enables them to reach decisions quickly on what changes may be desired, thus eliminating the need for any additional office time in revising the plan.

This system can be used by farmers who already have farm plans, but who desire to revise or review them. Likewise, it fits into the natural leader-neighborhood group program.

Disadvantages found last winter are relatively few. It does take time to train farm planners to use the new system and to become adept with the stereoscope. Initial resistance to a change sometimes must be overcome.

It is necessary to have a well-trained soils man in the area, and usually at the planning meeting.

Some farmers have difficulty in reading stereoscopic images and require more time than others for adjustment. A simple and inexpensive way of producing vectographs—not yet developed—

would eliminate the use of stereoscopes and make the job much simpler.

Summing up his experiences with the plan, Dr. Isgur says: "We have observed that farmers participating in winter "off-farm" planning have a better idea of what soil conservation is and what it means than do farmers whose plans are made during the rush of spring, summer, and fall work, when their minds are not completely free to think about their problems and about what a conservation plan can do for them."

SPEEDING SCIENCE TO THE FARM

(Continued from page 101)

Through careful check on the amount of water entering each irrigation furrow, the amount that passed the one-fourth and three-fourths points, and the amount that left the end of the field as surface waste, the teams were able to ascertain accurately the water intake rate of the soils in the various fields. At the same time, they were able to determine, by examining the soil surrounding the roots of growing plants, how much of the water applied actually benefited the crop and how much was lost through deep percolation. Equally important was the information gained concerning the erosive power of different heads of water under varying conditions of slope, soil texture, and cropping conditions.

From the facts revealed by the studies each team of technicians was able to make accurate recommendations as to the amount of irrigation water to apply in order to irrigate the crop thoroughly, yet safely, without waste of either water or soil. They were also able to tell farmers how many hours to irrigate, whether irrigation furrows were of proper length and gradient, and under what conditions water would cause serious erosion.

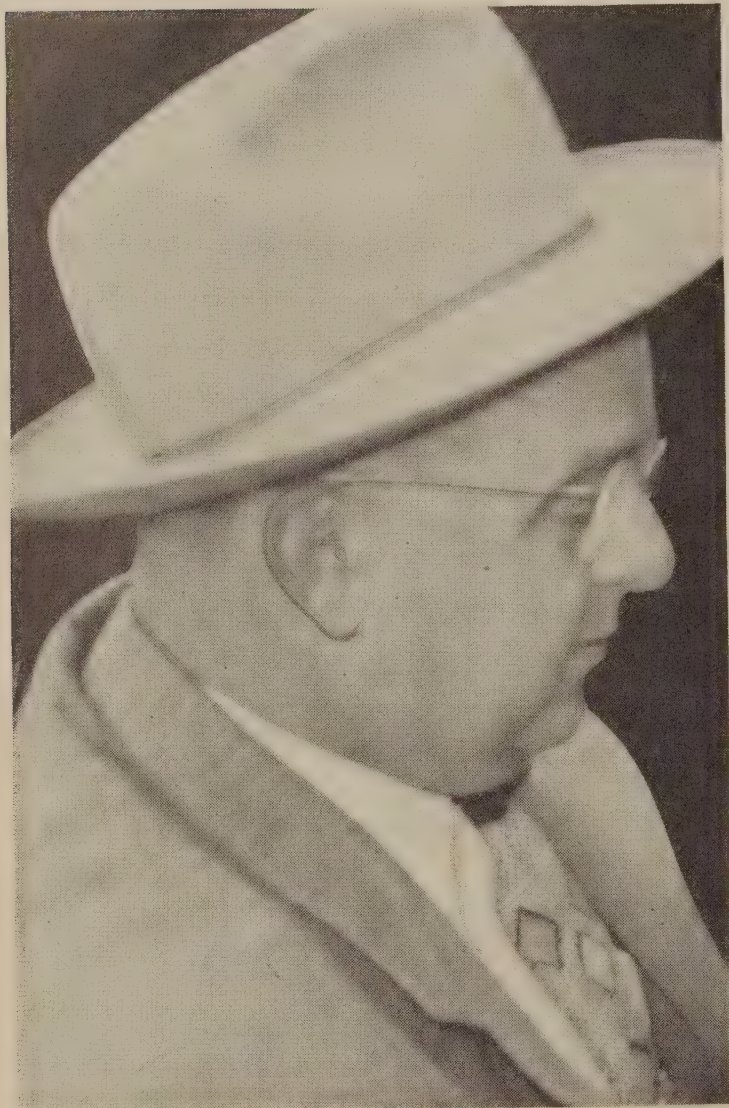
Said Joe B. Rogers, district conservationist for central Oregon, "Now we can actually show the farmers in our districts what we mean when we talk about saving water and soil."

TIMELY SUGGESTION.—What do you think of Dr. Patrick's discussion of winter planning with a stereoscope? How does Bill Southworth's article, "Speeding Science to the Farm," appeal to your common sense? And did you find that special water issue in October of interest?

This is a good time of year to mull over the ideas in SOIL CONSERVATION Magazine, and to pass some of them along to your neighbor. Maybe he doesn't know about this periodical. His subscription, \$1 in advance, will make him a member of our growing family of readers. Tell him to send it directly to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

DISTRICTS VIE WITH DISTRICTS IN SILVER STATE

By RALPH PARTRIDGE



Fred Sykes.

CONSERVATION HISTORY was written in Colorado last September when a trio of experts made a 12-day, 2,400-mile tour into all sections of that State. The occasion was the wind-up of the second annual soil conservation contest sponsored by the *Denver Post* and Radio Station KLZ of Denver. It was the most intensive study of its kind ever made in such a short period. It took the judges into 13 soil conservation districts and onto 39 farms.

The 13 districts, selected in earlier competition, were the finalists in the State-wide contest. Each district was represented by three individual farms or ranches but was judged in addition on its work

as a whole and on the administration and leadership displayed by the board of supervisors.

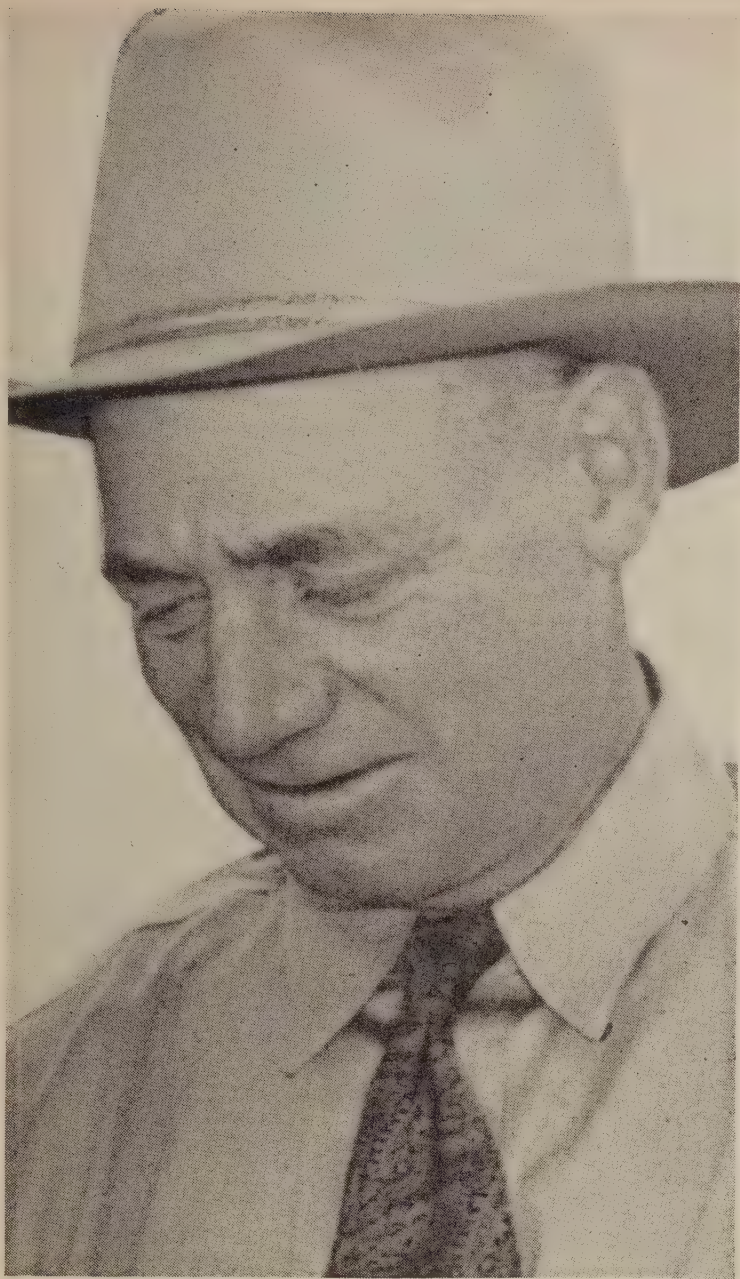
The farms and ranches, which among them represented virtually every type of agriculture in Colorado, were judged on the use of land according to its capabilities, the extent to which recommended conservation practices had been applied and maintained, and the quality of the work done.

Judges in the State finals were Fred J. Sykes of Salina, State conservationist for Kansas; Guy Stewart, extension service supervisor at Colorado A. & M. College, Fort Collins; and L. B. Cassel-



Guy Stewart.

NOTE.—The author is farm editor, *Denver Post*, Denver, Colo.



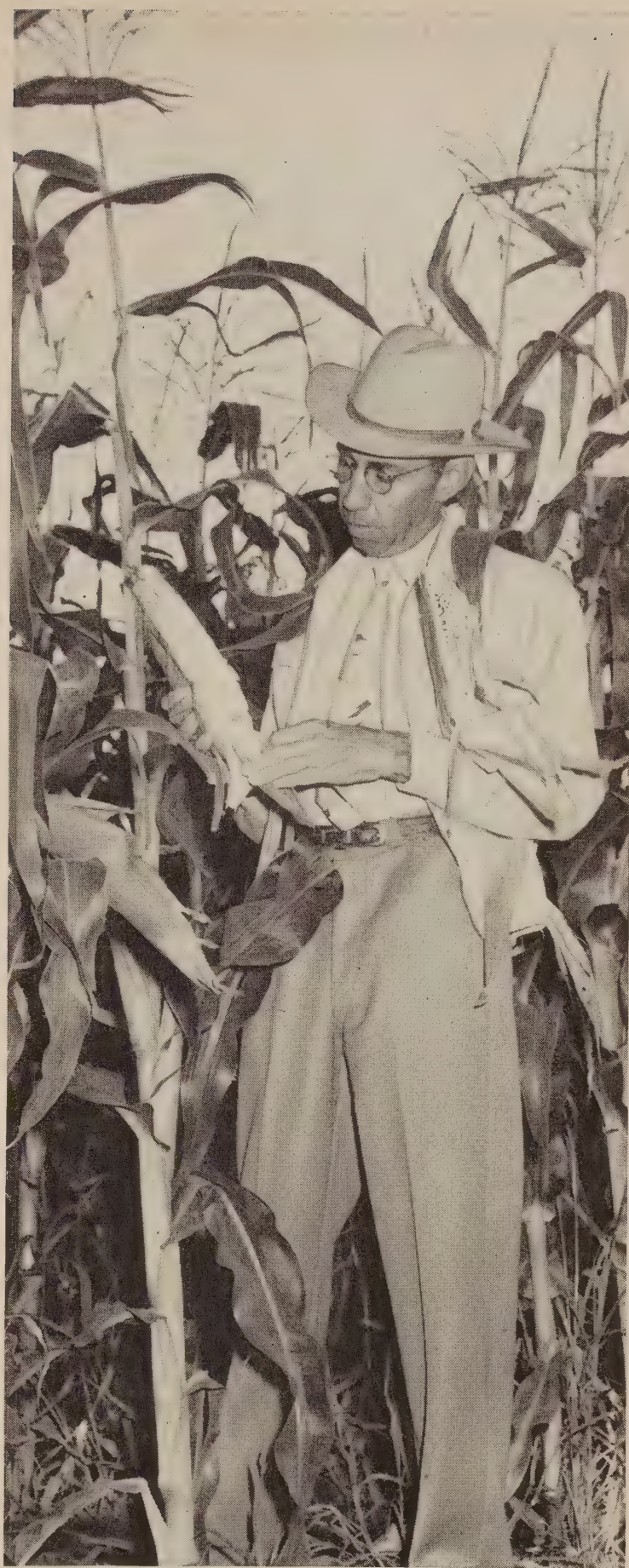
L. B. Casselman.

man of Mosca, Colo., president of the Colorado Association of Soil Conservation Districts.

These three carefully checked district operations and the accomplishments on each of the farms and selected the Fort Collins District as number one. Others in the first five were the Bent District, Las Animas, Colo.; the Mosca-Hopper District, Mosca, Colo.; the Fountain Valley District, Colorado Springs; and the La Plata District, out of Durango.

Each of these districts will receive a \$500 cash award from the *Post* and KLZ. Each also will be recognized with a plaque, and the three farmers or ranchers who represented each district will get a framed scroll.

George T. Sinton, farm manager of the Sinton Dairy Farms, Colorado Springs, emerged as top



Sinton admires his fine hybrid corn which grew more than 11 feet high this summer on land that was pasture last year.



Bluegills abound in this small reservoir, one of many small lakes and ponds on the Sinton properties.

individual, with 492 points out of a possible 500.

Sinton operates about 2,000 acres which include almost every type of soil conservation problem in the Colorado Springs area.

He has 350 acres of irrigated land, including corn land, alfalfa, and irrigated pasture. The remainder is dry-land range. The soil ranges from extremely heavy to very sandy. Sinton has licked the problems presented by each.

Example: One small area of sand so nearly pure the casual observer detects no soil whatever in it has been planted to brome grass, crested wheat, and

clover. The brome particularly is thriving.

Sinton applied a little barnyard manure to this area and now is pasturing it lightly. The cattle, in addition to adding more fertility through manure, punch part of the vegetation into the sand, where it is decaying and adding more organic matter.

Extensive areas of the dry-land ranges have been reseeded. Erosion has been halted through contour furrows and the thick vegetative cover Sinton has developed. Gullies have been healed through

(Continued on page 109)

STRIP MINING AND LAND RESTORATION

By GROVER F. BROWN

NOTE.—The author is chief, agronomy division, Soil Conservation Service, Washington, D. C.

WHILE in England last summer, I made a study of the restoration of strip-coal mining areas. England has some of the same rehabilitation problems in connection with what they call open-cast coal workings as we have here.



Open-cast coal workings in England. Spoil banks are later dumped back and the land returned to farm use.



This land has been restored to grass and legumes, satisfactory stands resulting the first season. Land in background is still to be restored.

The war, with its revelations of food problems, brought the island to the grim conclusion that it could not afford to lose agricultural land.

Industry must have coal, the people in industry must eat. So must everyone else. England is making every effort to obtain the coal and the food from the same land. This means that land which was surface-mined must be put back into agricultural use after the coal has been removed.

Many problems rose in connection with full restoration and regrassing of these areas, but they are well on the way to being solved. Naturally, when the mining operations go to such depths as 30 to 170 feet, drains are destroyed and removal of surplus surface water becomes a major problem. The structure of the soil is completely upset and, in addition to this, there are acute deficiencies of soil nutrients, general lack of fertility, and unfavorable soil structure.

Nationalization of the coal industry means, of course, that the Government owns the coal and handles all marketing problems. Since the early war years several thousand acres have been requisitioned for open-cast coal workings in the farming areas. In most of these areas the farms are small and dairying is a major enterprise. In discussing with several individuals the way coal mining is handled, I found that the Government makes test borings for coal and determines the amount of overburden and the thickness of the coal veins themselves. With this basic information and the decision to mine the coal, the land is requisitioned from the landowner. In some cases entire farms have been taken over and in others only parts of farms. A county committee of 12 members determines a fair rate of rent for the farmer. This is paid for the period of time required for mining. In some cases the owner may or may not get enough rent to meet his needs completely and he may either have to sell off part of his livestock or make other arrangements.

After the land has been requisitioned, contracts are let to private companies for actual mining operations. The contracts specify that the topsoil shall be removed first and piled to one side. The subsoil, to at least a 3-foot depth, is moved next and piled separately, parallel to the topsoil. Then the contractor goes ahead and mines the coal in more or less trench fashion. As one trench is completed, the slag from another trench, instead of

being piled again on top of the ground as it is in this country, is put back into the hole made by the first trench. This operation continues until all the vein is worked out, so that in reality the final trench is filled with material from the first trench. The contractor then must return the whole field or farm to as nearly the original contour as possible so that the drainageways match up with those of upper and lower fields. The subsoil then must be spread over the field 3 feet thick and then covered with about 6 inches of topsoil. Fences are then rebuilt where they were originally or set up in a new location more advantageous for utilizing the hay or pasture. Most of the fences I saw used concrete posts and no doubt were very much better than the farmer had before. This completes the mining contract.

The Government then limes the field with from 3 to 4 tons of ground rock, fertilizes with 800 to 1,000 pounds of superphosphate and about 200 pounds of sulphate ammonia, and seeds to a grass-legume mixture. After the grass becomes well-established, usually in the first or second year, the farmer may then return to his land and utilize the hay or pasture. The Government in some cases, as I got the picture, may carry along the top-dressing program for 5 years to be sure of a satisfactory stand of grass and legumes. Any sinking or pot-holing due to settling will usually occur in the first 5 years. At the end of that time the farmer regains full possession of his land, but he is urged not to plow until the land has been in grass and legumes for at least 10 years. This is designed to reestablish, to some extent at least, the desirable structural characteristics of the soil and to increase its organic and biological functions.

Naturally, the question of cost of rehabilitation comes up. I asked about it in every mining area I visited. In view of the fact that this is a rather new approach by the Government, cost figures were not generally available, but I did get an estimate of 10 cents to 20 cents per ton of coal mined, as an additional charge against the coal. In other words, the rehabilitation of areas disturbed by mining would not be economically feasible from strictly an agricultural point of view. But when this additional cost is applied to each ton of coal mined, it becomes a very economical job to put the land back into use after the mining operations have been completed.

I saw thousands of acres of pastures and grass-

legume hay that were from all appearances as good as many of the surrounding lands. One would never know that the land had been mined and the soil completely changed. Most of the fields were producing good grass and legumes and the goal had been achieved of utilizing the natural resources of coal for vital industrial purposes, and yet the land again was in a position to produce needed food for generations to come. I walked over many of these fields and was surprised at the growth obtained. It appeared, and a number of the men agreed, that even better results would be obtained with heavier rates of fertilization. The organic matter, of course, was largely gone after the mining operations, and the structure and tilth were poor. It would have been better had they mulched or used manure or other forms of organic matter before seeding. But by keeping the land in grass for 10 years, they felt it would be possible to reestablish the structure and the biological activity to nearly the original level.

It appeared to be easier to get a stand than to maintain it. Here again was revealed the lack of organic matter, the structural and biological features caused by mining operations. It will take a number of years of good grass and legumes growing on these lands to bring them back. Coal, nevertheless, is necessary for industry and this operation seems the best way to get coal and still have the land useful for farming. When one considers the advantages of strip mining compared with pit mining and the increasing use of power equipment, this problem looms much more serious in this country than previously. Strip mining recovers more than 90 percent of the coal in the vein as compared with 50 or 60 percent obtained from deep pit mining. The cost of pit mining is about two and a half times greater than that of open-cast mining. There is also a feature to consider in favor of strip mining in connection with the ease of the operation: Safety measures can much more easily be installed and fewer men are required to obtain a ton of coal.

Coal runs from 1,500 to 1,700 tons per acre-foot. The veins vary in depth, depending on circumstances, but a 4-foot vein will produce 6,000 to 7,500 tons per acre. In view of the cheaper cost of open-cast mining, it seems reasonable to me to consider a slight additional charge of a few cents per ton of coal mined, which would pay for the rehabilitation of the land and still enable oper-

ators to put coal on the market cheaper than by any other system.

Here in the States this destruction of land, our basic resource, is rapidly becoming of public concern. The problem of erosion, siltation of downstream channels, ruination of land for further agriculture, recreational, or other purposes is rapidly coming to the attention of the public. Some of the States have made efforts to pass laws that would in some measure aid solution of this problem. In general, about all that is done, however, is the leveling of the spoil banks on top so that some reseedling of shrubbery or trees may have a better chance of success.

I think with the increasing amount of this type of mining taking place we need to give this method that the British are using very serious consideration. Restoring mined lands to use for either farming or forestry is well worth the attention of mining companies. There is no reason why we cannot have our coal and our farms, too.

DISTRICTS VIE WITH DISTRICTS

(Continued from page 106)

planting of shrubbery, which provides browse for cattle and feed for the birds that abound on the place.

Sinton rounded out his program by reclaiming 35 or 40 acres of waste land along an old creek bed. There a system of dams and ponds provides a wildlife area which at times attracts thousands of ducks and other types of waterfowl.

This farmer declares conservation is the sum total of many little things and says that in addition to the monetary benefits, he is deriving a great deal of satisfaction through his part in safeguarding the Nation's soil and water resources.

Sinton and other farmers and the judges were enthusiastic in their praise of the contest. They believe it is doing much to stimulate public interest in a vital cause.

On Monday, October 3, the three farmers or ranchers representing each of the top five districts were guests of the *Post* and KLZ at a dinner in Denver and guests of the Denver Chamber of Commerce at a noon luncheon.

Recognition banquets are being sponsored by various organizations in each of the five districts.

SEVEN YEARS OF SCHOOL CONTESTS

By HARLEY A. DANIEL, LOUIS E. DERR, AND EDD ROBERTS



These FFA members are classifying lands, studying soil-test charts, determining best cropping conditions and fertilizer needs during the 1948 soil conservation contest on the Red Plains Conservation Experiment Station, Guthrie, Okla. Photo by Tom Daniel, Oklahoma A. and M. College.

IN SCHOOL CONTESTS, which are gaining rapidly in popularity, young Oklahoma is learning the why and how of soil and water conservation.

And although it is mostly 4-H Club, Future Farmers of America, and Veteran Agricultural trainees who are taking part in most of these courses and exercises, here and there are groups of older farmers who are getting much useful information from similar activities.

NOTE.—The authors are project supervisor, research; State soil scientist; and extension soil conservationist; Oklahoma.

The purpose of such contests is to teach the student to put each piece of land to the use for which it is best suited and to treat it according to its needs for controlling erosion and improving fertility. In fact, all the practices and treatments necessary for developing and maintaining a permanent agriculture are stressed.

Students are given a better understanding of a coordinated program which includes sound land use, the right combination of conservation practices, the maintenance and improvement of soil

productivity, and economically sound conservation farming.

Contests of this nature have grown out of the 4-H Club and Future Farmers of America soil conservation schools and contests that have been held annually at the Red Plains Conservation Experiment Station, Guthrie, Okla., during the last 7 years.

Schools and contests usually take all day. Mornings are devoted to a study of soil conservation and improvement, while afternoons are set aside for the contests.

For schooling, the participants are divided into small groups and taught the difference between soils and classes of land that can be safely or cannot be safely cultivated. Also given attention are the methods of treating each type for maximum erosion control and production. The participants are taught to identify different grasses, legumes, and trees, and to recognize their value for

conservation.

In the afternoon, contestants identify soils, classify land, and recommend the treatment necessary on a selected plot of land. This procedure continues until each class of land represented has been studied.

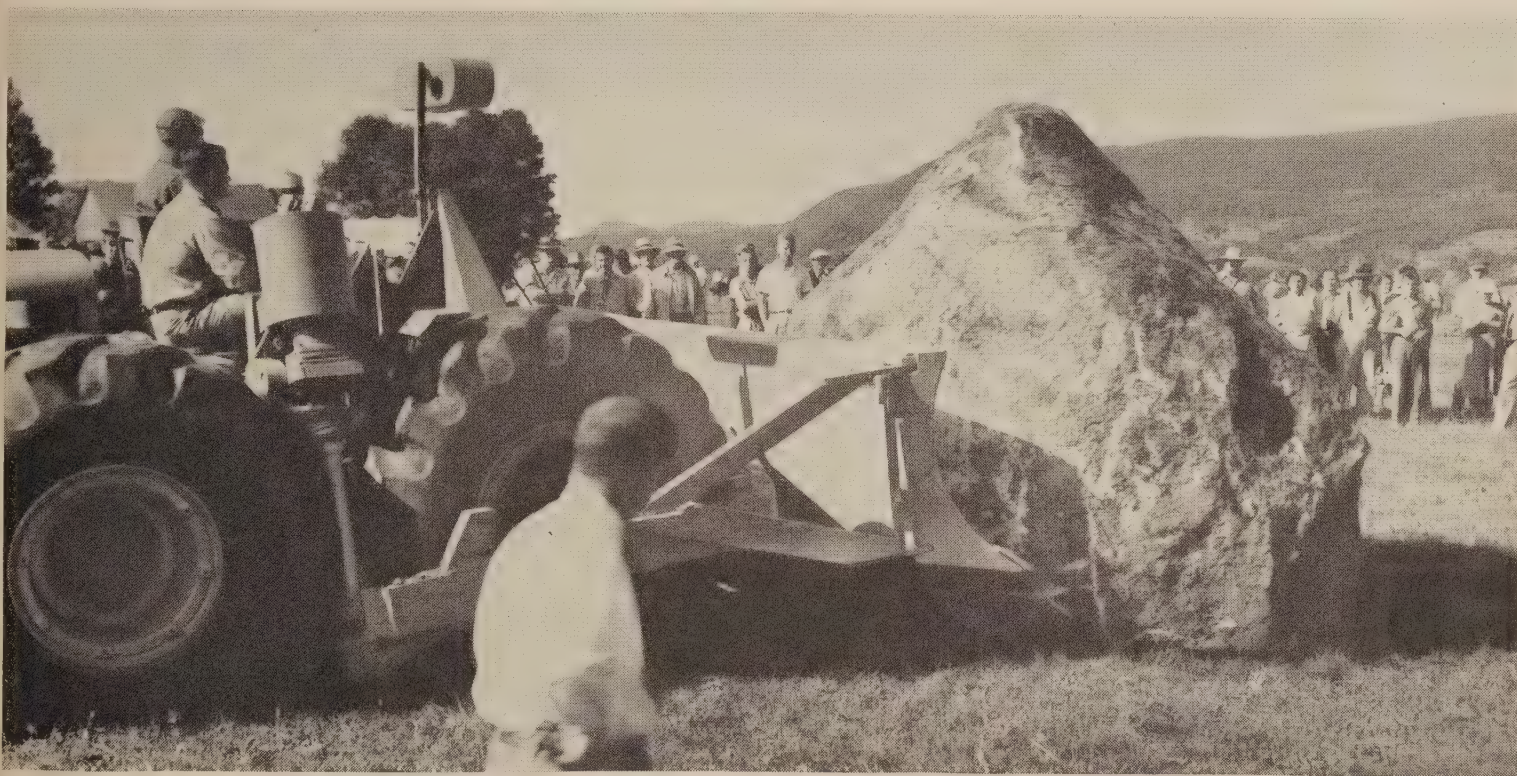
As each field is completed, papers are collected. Correct answers are then explained to contestants by the guide, who then gives each participant a chance to ask questions about the land, its treatment, and cropping systems.

Another part of the contest often consists of the identification of common grasses, legumes, and trees, and their seeds.

After the contest is over, scores are added and winners determined. Winners may be teams or individuals. Soil-saving and soil-use training of this type will bring about a greater appreciation for the land. It also will expedite the conservation movement.

FARM ON ALL-DAY TELEVISION SHOW

By BILL GIVENS

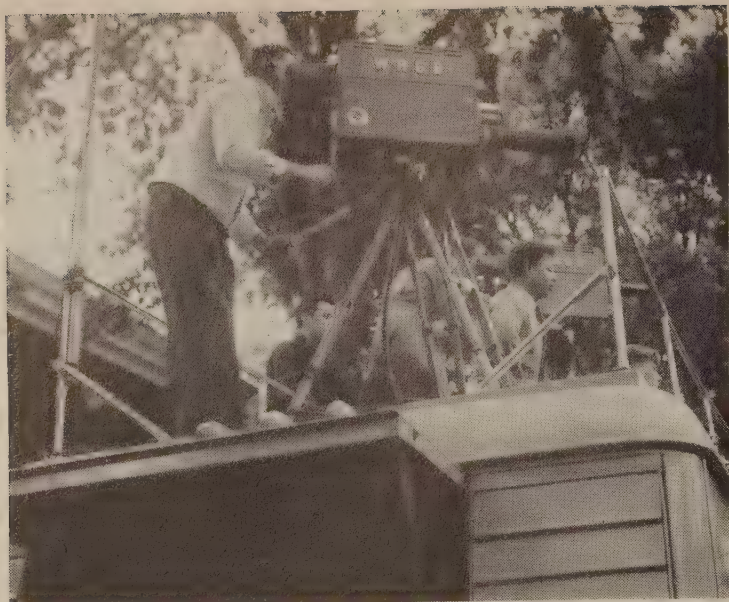


One of the big boulders nudged away and buried in the building of a farm pond.

TELEVISION HISTORY was made by Station WRGB on the Walter Hadala farm near Adams, Mass., on August 16. A day-long, continuous

NOTE.—The author is supervisor of farm broadcasting for the General Electric Company stations, Schenectady, N. Y.

television program featured only the one event—the Berkshire County Farmers Field Day—which starred soil and water conservation and good land use.



Television crew on the job.

Inasmuch as Adams is outside the 50-mile radius usually allowed for satisfactory coverage, it was necessary to transmit this program by means of what is known as a two-hop relay. Here's how it works: WRGB's recently acquired 8-ton mobile unit picked up the various demonstrations and transmitted them from the Adams farm to a temporary relay tower atop nearby Mount Greylock. From Greylock the program was then beamed to the station's permanent tower atop the Helderberg Mountains west of Albany, N. Y.

Opening ceremonies at 8:45 in the morning included remarks by John Chandler, Massachusetts State commissioner of agriculture, and a flag raising by the Massachusetts National Guard. From 9 o'clock until quitting time late that afternoon, farmers and others who had television sets really received an eyeful of soil and water conservation—the first big face lifting in New England.

The first event televised was the construction of a farm pond. Commentary was provided by Ben Isgur, district conservationist in the Berkshires. Periodically we pulled our camera away from the pond to conduct interviews with many prominent agricultural personalities, such as Dr. H. H. Bennett, chief of the Soil Conservation Service.

Another morning high light of our telecast was the filming of the farm-equipment demonstration. Each of the eight major farm machinery companies represented was given an opportunity to display its equipment before WRGB cameras.

At noon we moved from the north to the south end of the Hadala farm to another of the power outlets installed for the occasion. During the hour allowed for moving cameras, appropriate farm films were presented to WRGB viewers.

In my 10-year association with radio, and my 2 years with television, never have I seen the likes of the show put on by bulldozer drivers to open the afternoon's events. Three bulldozers lined up about 200 feet away and in front of our cameras, each with two 5-ton boulders in front of it. Armed with these mighty playthings, they proceeded to move at top speed directly into our camera lenses—what a sight that was! One of the drivers came within 10 feet of the mobile unit, completely filling the television screen with this massive expanse of stone. The reaction of the technical crew was to open the emergency exit lest a hasty departure be indicated. As it turned out, the 10 feet between the boulder and mobile unit was ample, but two more rolls would have spelled disaster. It was an amazing spectacle, one which lasted for an hour, with these mechanical giants gouging immense craters in which to bury the rejected boulders.

Other events telecast that afternoon were tearing up a huge stone wall by power shovel; liming a 40-acre tract of pasture land; and, finally, the felling of timber in the Hadala wood lot—a dramatic ending to a thrilling day.

Our cameras caught many small incidents chock full of human interest. For example, a 2-year-old became separated from his mother, but through the medium of television was restored safe and sound because his mother was in the women's display tent where a television set had been installed, saw her little darling in the picture, and claimed him promptly.

Another program favorite was a 2-month-old baby, youngest person attending the field day.

A woman from New York State became so interested in the construction of the farm pond that she shut off her set, got in her car, and drove to Adams!

The effectiveness of this great open-air show—the first of its kind—was largely due to the technical crew, who labored long hours to make the program possible, and to Emerson Markham, manager of our stations, the man who conceived the idea of bringing this great outdoor event to the watcher at the fireside.

WE'RE SAVING SOIL IN PUERTO RICO, TOO

By OTTO L. PIKE



Pike records "marked success" in pineapple fields.

FOR 26 years I've been in Puerto Rico, the last 21 of them on the same property. In 1909 this farm was about as God made it, covered with forest trees, native grass, and used as pasture. That year it was bought by an American company from Buffalo, N. Y., and they immediately started clearing the land and planting citrus trees. I planted the last acre of grapefruit in 1931, as the company manager. Then in 1938 I bought the farm.

The groves were cultivated and planted to cover crops, usually crotalaria. The crotalaria is a legume, and makes a very thick and heavy growth; the stalks are woody and have a diameter of $\frac{1}{2}$ to 1 inch, and are from 3 to 6 feet tall. Therefore,

the ground cover was almost as good as under forest conditions, as far as erosion was concerned. The trees were planted in straight rows, paying no attention to slopes. Only once in a while on an unlucky day when we got a heavy rain right after cultivation, and before the cover crop got started, did we get any erosion.

Now, the nearly complete loss of our citrus market has greatly changed the cultivation practices on this property. From trees and cover crops we have changed rapidly to clean-cultivated row crops. The purpose of this narrative is to relate the differences of soil and water action with the change in cultivation, and to show the need for organized soil conservation districts. The Soil Conservation Service is making good progress in

NOTE.—The author farms near Arecibo, P. R.

Puerto Rico but there is great need for more work.

I can tell nothing not already known to people in close touch with conservation. I am just one more witness.

I started keeping a daily rain record from a gage outside my house on July 1, 1932. In the past 17 years the lowest rainfall in a calendar year was 43.89 inches in 1946, and the highest was 83.10 inches in 1938. The lowest calendar month was March 1947, with 0.15 inch, which came on the 31st of the month. The highest month was May 1936, 19.68 inches, which followed a 5-month drought. Our heaviest downpour was November 7, 1944, when we got 5.82 inches in 2 hours. Tremendous damage was done all over the island. A rain like this causes more erosion than years of ordinary rains. Most of our rains come in short afternoon showers. We never see fog and rarely have a cloudy day. It rains or the sun shines, and frequently both at the same time. All of this affects soil conservation. These violent showers make more and bigger ditches necessary in the fields. An inch an hour is the usual rate of rainfall here; it takes a very heavy thunder shower in New York to equal that.

The first fields that I planted after taking out the fruit trees were in straight rows, as usual in this region. Contouring did not occur to me as I had never had any experience with it, and there was no Soil Conservation Service in Puerto Rico at that time. Never having seen running water on this farm, it did not occur to me that there would be any. I was just like everybody else in these ignorant pre-soil-conservation days.

My soil is light sandy loam on 5 to 10 percent slopes. Spotted around on this general level are isolated hills of solid rock, covered with brush and forest trees, which no one would ever think of cultivating. On January 10, 1938, I planted a 9-acre field to straight rows of sugarcane. It had previously been an orange grove. Two days before we had had a 3-inch rain, so the land was full of water and just right for planting. For the next 3 days we had a shower each day, saturating the soil. This was followed on the afternoon of the 14th with a rain of 5.10 inches.

Sugarcane seed (which is a piece of the stalk) is heavy, weighs 1 to 2 pounds, and will float. A third of the seed in this field, and all of the soft soil in the furrows, was carried away, leaving hard-bottomed furrows in the subsoil. Some of it was

deposited at the ends of the furrows and in a public road that runs past the field. A great deal of the seed and topsoil was carried across the road to a lower field, and a pond an acre in size was formed where there had never before been a pond. I hauled back numerous cartloads of seed from the road and pond to replant but my good topsoil and fertilizer were lost forever. The pond dried up in a month, but every time it rained this low spot collected water again.

In January 1944, I again planted this field to sugarcane, but in the meantime had learned a little about soil conservation. The Soil Conservation Service had established an office and had been showing some of the farmers in this section how to prevent soil erosion. I made the rows level and on the true contour, with deep furrows. I was fortunate and did not get any cloudbursts just as the land was planted, but we did not have lots of rain. These level furrows held all the rains that came and there was no running water. The pond dried up permanently and the place is planted again. That level system did a good job, but I have since become convinced that the furrows should have some slope to guard against an occasional heavy rain. The cane fields I am planting this year are being given 1 percent of slope. Other crops, such as pineapples and gladioli, which are planted without furrows and do not give much ground cover, are being given a 2-percent slope. This makes necessary some drainage ditches, and these are put in every 6 feet of vertical change in elevation, or 200 feet in horizontal distance, whichever comes first. This has resulted in marked success in my pineapple fields. Two low spots that were always under water in rainy season (even when the land was in trees), are now dry and planted. Some spots that could not be planted previously because every rain started a stream flow are now being planted.

The benefits of contouring are immediate. The rains do not carry soil and fertilizer away. In a dry spell the crops do not wilt so much as previously for what little water falls stays about where it lands, and the plants have it for a longer time. I am getting more production per acre. Of course, the initial preparation of the land is more expensive, but over a period of years the investment pays off. The main ditches have to be made only for the first planting, for I do not plow through them but along them the following seasons.

SCS men have helped me right along. Recently a new district chief, just down from the States, was here. He said this is the most diversified and interesting farm he had ever seen, and I have the only roses, gladioli, ferns, and other flowers that he had ever heard of being planted on contour.

The oldest roses are in a 6-acre field we planted in straight rows (where I dug out a grapefruit grove), before I realized the need for contouring. Needless to say, the new field is contoured. It hurts every time I look at my old roses in a rain, for the water runs down every row, carrying off the fertilizer and fine sugar-refuse mulch. The sand plugs up the ditches by my driveway, and there is a long windrow of topsoil that is shoveled out of the ditches after every rain.

The only disadvantage of the contoured rose field comes when we have to spray with insecticides. It is impossible to drag hoses up the curved rows without damaging the plants, so I have put an extra man on each hose to lift them over the

bushes. We are using 100-foot hoses, two on a sprayer. The same applies to any field that has to be sprayed. We are now using weed-killers on sugarcane that is sprayed. The curved and short rows bother some, but the fields are laid out so that there are no blind alleys, and the cultivator can always find a way out.

Once in a while there is a low spot from which water cannot drain. With the help of SCS technicians, we made ditches around the top so that no water could run in; all the water that gets in is what rains in, and evaporation takes care of that small amount. These spots are very fertile and crops that do not mind wet soil for a day do well.

The Atlantico Soil Conservation District, of which I am a part, is doing a very good job in this part of the island. So are the technicians of the Soil Conservation Service. They seem to enjoy showing us how to keep our soil from washing away. The district program will improve agriculture in Puerto Rico and will give us bigger yields for a longer period of time.

EXPERIENCE WITH IRRIGATED PASTURES IN COLORADO

By R. H. SEARWAY

THREE TONS of meadow hay per acre from a 2-year-old grass stand! This yield may sound high, but it should be the average rather than the exception in the Salida section of Colorado, thinks Al Predovich, who has cut 45 tons of hay off 15 acres on his Missouri Park farm this year.

Before going deeply into production, however, let's take a look at the history of Predovich's farm, which he acquired in 1940. Year after year he planted alfalfa or small grain, mostly the latter, and plowing, irrigating, and harvesting were annual tasks. There always seemed to be something to reduce the annual yields of small grain—either hail, a shortage of water, or cold, damp spring weather. The return from the small grain averaged only about \$40 per acre, although he did have

some wheat that produced 80 bushels per acre in 1946.

Discouraged with the crop yields, Predovich sought assistance from the Upper Arkansas Soil Conservation District in 1946, and received technical aid from SCS in planning a new cropping system designed to put each acre to its best use.

In January 1947 Predovich plowed 15 acres that had been in wheat, disked it two ways, harrowed it, and then leveled the field with the district-owned machine. He then drilled and cross-drilled the 15 acres at the rate of 22 pounds of seed to the acre. He used a mixture of 6 pounds each of smooth brome, meadow fescue and orchard grass, and 2 pounds each of alsike and yellow sweetclovers.

Predovich irrigated the field seven times during the growing season and kept all livestock off the new grass. In fact, he didn't even harvest the

NOTE.—The author is work unit conservationist, Soil Conservation Service, Salida, Colo.

hay in the fall of 1947, but let it fall back for winter production. The second year the meadow required only three irrigations with the water set for 6 hours in 300-foot runs.

When this 15-acre field was cut in July it yielded 3 tons of hay per acre, and then produced another half ton per acre, which is being grazed off this fall.

Predovich seeded another pasture of 7 acres in April 1948 and 15 acres more last spring. He used the same grass and clover mixture, except that on the 7-acre field he added 4 pounds of reed canary grass and 2 pounds of strawberry clover because this field was too wet for small grain due to the high water table. Cut this summer, these fields yielded 3 tons of hay to the acre and an additional half ton for fall grazing.

With hay selling at \$15 a ton, this means that the 3½-ton yield gave a gross return of \$52.50 an acre, with only haying and irrigation expenses to be deducted. Predovich estimates that it cost about \$22 an acre to establish the irrigated pastures as compared with an annual cost of \$14 an acre to plant small grain under his old cropping system.

His goal is 80 acres of irrigated pasture with enough cattle to do the harvesting so he won't even have to go to the expense of harvesting hay.

AT LAKE SUCCESS

Eighteen foreign technicians from thirteen countries, who received training with the Soil Conservation Service, participated in the recent United Nations Scientific Conference on the Conservation and Utilization of Resources at Lake Success.

Delegates presenting papers included: Marcos Orozco, chief, Soil Conservation Service, Guatemala; Manul Chavez Viaud, chief, Soil Conservation Section, El Salvador; U Aung Myint, senior agricultural assistant, Department of Agriculture, Burma; and René L. Ambroise, chief, Soil Conservation Service, Haiti.

Six who contributed papers read at the section meetings but were unable to attend: S. P. Raychaudhuri, soil scientist, Ministry of Agriculture, India; A. T. Sen, soil scientist, Ministry of Agriculture, India; A. G. Riaz, soil conservation officer, Ministry of Agriculture, Pakistan; M. H. Khan, forest officer, Ministry of Agriculture, Pakistan; F. Jurion, director general, National Institute of Agricultural Research of Belgian Congo; and Carlos Diaz Vial, agronomist, Ministry of Agriculture, Chile.

Eight delegates participated in the discussions of various section meetings: Gonzalo Andrade, assistant agricultural attaché, Mexican Embassy; Sebastian A. Romero, chief, Soil Conservation and Forestry Department, Venezuela; Henrique Delgado, agricultural engineer, Ministry of Public Works, Venezuela; Maung Kyi, forest officer, Shan State Department of Agriculture, Burma; J. K. De Haan, chief, Bureau for Soil Utilization, Indonesia; Suh Kwang Jin, soil conservation officer, Department of Agriculture, Korea; Hernan Uribe, assistant soil conservationist, Fed-

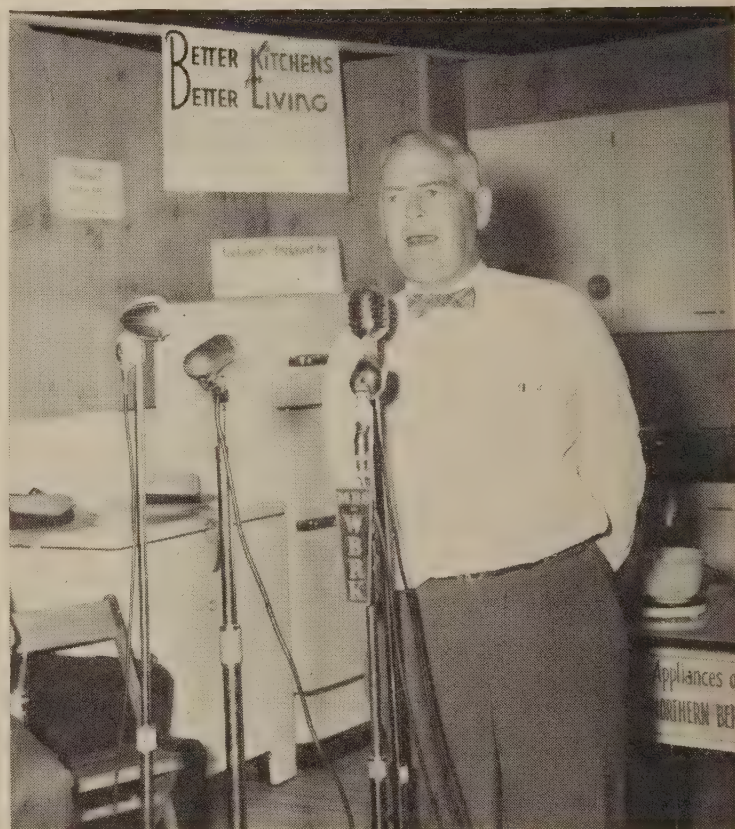
eration of Coffee Growers of Colombia; and D. G. Kelkar, soil conservation officer, Baroda State, India.

René L. Ambroise of Haiti was honored by being nominated chairman of one of the section meetings.

NORTHEAST

FOUR TOWNS—TWO STATES.—Next to the 40,000-foot overhead irrigating system, which carries up to 900 gallons of water per minute to his vegetable crops, visitors to Frank Clegg's farm at Seekonk, Bristol Soil Conservation District, Mass., are mostly interested in the fact that he gets his water from two farm ponds. Clegg's one-piece 65-acre farm lies in two States and four towns—Seekonk and Swansea, Mass., and East Providence and Barrington, R. I. Before setting celery, this farmer irrigates for twelve consecutive hours, which means putting 50,000 gallons on each acre.

SOUND FOR ALL.—"Soil conservation, as fostered by the Soil Conservation Service, is sound for us as farmers, and good for our communities, for the Commonwealth, and for the Nation," John Chandler, State commissioner of agriculture and chairman of the State Soil Conservation Committee in Massachusetts, declared recently.



John Chandler speaks at Berkshire farmers soil conservation field day.

PONDS AND PEACHES.—At a critical production period in the midst of last summer's drought, when leaves in his Elberta peach orchard were drying up and partly developed fruit was falling, Edgar Downing, an orchardist of Millbrook in Dutchess County, N. Y., resorted to a small farm stock pond that he had built a year earlier. Using an old

fire hose and a small pump, he applied 200,000 gallons of water to 2 acres of trees. When the crop from this block was harvested, the size of the fruit had increased fully a third. More, its development had been retarded enough to allow Downing to catch a more favorable market than otherwise. In addition, he says, the trees in this block are in better condition to set buds for the 1950 crop. Trees not irrigated have leaves with a yellowish tinge and new growth has been held back. The peaches on these trees ripened prematurely and lacked size compared with those in the irrigated block. "One irrigation paid for all the cost of building the pond," Downing maintains.

POND SAVES BUILDINGS.—A day's work with a bulldozer, excavating a simple farm pond on the site of a washed out, abandoned ice pond, paid dividends last August when flames attacked Willard T. Gaskell's barn near Rome, N. Y. When 60 firemen and 2 pumpers arrived from nearby towns, all the water available was in the pond. The barn was so far gone that they turned attention to the granary, tool shed, and farm home—all within 70 feet of the barn. The pond water saved the granary and tool shed and was doing good work protecting the house when a kindly wind veered its course and carried the sparks away. The pond, 40 feet square, with water 5 feet deep, was constructed under supervision of SCS technicians working with the Oneida Soil Conservation District.

FARM LABORATORY.—At his 450-acre dairy farm outside Ridgebury, Conn., Harold S. Goldsmith is developing a field laboratory for soil and water conservation. Many other farmers are watching his experiments closely, because they believe they can apply some of the same practices and quickly pay the costs out of increased income and reduced operating expenses.

Following a complete conservation farm plan developed by Walter Gonick, George Sweeney, Floyd Hileman, and Ted Powlowski, SCS technicians working with the Fairfield Soil Conservation District, Goldsmith has embarked on an ambitious schedule of muck-spreading, fence-removal, pond-digging, and drainage and irrigation work, all to be completed in 6 months, before winter settles down. He and the technicians say it will pay for itself in 2 or 3 years.

Most revolutionary phase of the program, at least locally, is the spreading of muck, taken from a swamp area, over 50 acres of pasture land. A dragline shovel scoops it from a swampy depression right on his farm and loads it into three tractor-drawn manure spreaders that shuttle back and forth over the pasture. Main purpose is to increase the water-holding capacity of the soil and retard runoff. Muck holds twice as much moisture as ordinary soil, because of its high organic content, and adds valuable nutrients to the soil. It is being spread two layers deep over 25 acres that have a fairly high runoff, and four layers deep over 25 acres that are dry and sandy with a high runoff. The treatment is expected to double, and perhaps triple, the pasture value. Drier areas have been useless, except in early spring or late fall. All will be seeded with red clover and Ladino.

One of the 25-acre fields results from a stone fence re-

moval job that cost about \$500. It pulled four separate fields into one. Removal of the old fences added a half acre of tillable soil and reduced Goldsmith's operating costs by removing impediments to tractors and other equipment. The saving in operating costs and the increased production will pay for the work in a year or two—certainly before another seeding is necessary.

Another Goldsmith project is a network of drainage trenches designed to turn 20 acres of worthless swampland into pasture. The system centers in a ditch 3,975 feet long, 30 inches deep, encircling the field and emptying into a 425-foot runoff ditch that empties into a farm pond. Two straight ditches, totaling 275 feet and 8 to 12 inches deep, cut across the field, dividing it into three minor drainage areas. The big ditch intercepts seepage and picks up runoff that ordinarily would damage lower fields. The two short ditches pick up some runoff and help take care of extra heavy rainfall. Reclamation of the 20 acres will cost between \$75 and \$100 per acre. It will transform currently useless land into pasture land worth \$50 a year . . . pay for the work in 2 years.

Goldsmith is developing an aluminum-pipe irrigating system that works from three farm ponds, one at each end of the farm and the other about the center. One, with a 2-acre surface area, is where the muck is being excavated.

The purpose of the whole job is to put the farm in the best possible condition to produce high-grade feed for a high-testing dairy herd. Goldsmith has been successfully operating another 350-acre farm near Litchfield for 4 years. He has extensive interests in the magazine publishing field.

SOUTHEAST



TERRACES WITHSTAND CLOUDBURST.—When 5.2 inches of rain fell in 1½ hours in July, it washed away a railroad bridge above Alvin Emerson's farm near Cecilia, Ky., but did little damage to his terraced cornfield.

After watching water rush through his meadow in a stream 4 feet deep, Emerson figured his corn crop was gone. He had constructed seven terraces on the sloping 40-acre field last spring, as a part of a conservation plan with the Hardin County Soil Conservation District, but terraces were not expected to control cloudbursts.

To Emerson's surprise and satisfaction, the contoured corn stood up well under the downpour. In a few places the water had filtered over the edges of the terraces but the bottom terrace was the only one that had broken over and it had not washed away completely. Emerson said that he considered the break his fault as he

had neglected to build up a weak place in the terrace.

After viewing the damage to neighbors' farms, Emerson said, "Without those terraces my cornfield would have been ruined."

PAPER FROM SERICEA.—The chamber of commerce at Dalton, Ga., is looking into the possibility of getting a mill started there to make paper from sericea stalks.

V. H. Mock, a local farmer, and S. H. Christopher, land utilization conservationist, are encouraging such a project. Chamber of Commerce Secretary T. H. McMillan said one of the southern research bureaus had approved the feasibility of the manufacture of such paper, but the plan is still being investigated from an economic standpoint.

It is said that the sericea stalk can make fine grade paper as well as rough stock. And experiments indicate that the sericea paper has many of the better qualities of rice paper used for cigarettes.

FLORIDA TAKES TO AIR.—Florida's Flying Farmers went to the Miracle Soil Conservation Day at Sanford last spring. They left with a feeling that they could help in selling the need for soil and water conservation.

First result: 75 farmers, supervisors, and businessmen made an aerial tour of Pineallas Soil Conservation District 2 months later, the first of its kind in Florida. The Flying Farmers Association was host, and members provided and piloted the planes free of charge.

Flying Farmer President G. F. Ward offered the facilities of his group at any time, without cost, anywhere in the State, to further soil and water conservation work.

FARM TELECAST.—The Miracle Soil Conservation Day at Sanford, Fla., was presented on television June 29 from WCBS-TV, New York. Following the telecast, the film was forwarded to W. E. Witherell, district conservationist at Orlando, Fla., who planned showings in theaters at Orlando and Sanford.

UPPER MISSISSIPPI



QUALIFIED FOR PRIZES.—A new angle to a farm face lifting in the Mills County (Iowa) Soil Conservation District this year was a special prize drawing for farmer-helpers.

The face lifting was on the 160-acre farm of Eurel H. Anderson near Silver City. It was sponsored by the Mills County District, Radio Station KFAB at Omaha, with the cooperation of local SCS men, the county agent, and other agricultural leaders.

Any farmer actually working on the farm for 5 hours in preparation for the event or on the day of the face lifting received a ticket for a drawing of prizes. First prize was a \$1,340 farm tractor and second prize a \$400 hydraulic scoop. Other prizes of lesser value also were given.

WESTERN GULF



Part of the crowd at Corney Lake fish fry.

DECADE OF HIGH ACHIEVEMENT.—The D'Arbonne (La.) Soil Conservation District celebrated its tenth anniversary in August with a special program and fish fry at Corney Lake. Twelve hundred farmers and business people were there.

The Louisiana Bankers Association presented certificates of merit to 43 district cooperators for outstanding work in soil conservation. Kent Leavitt of Millbrook, N. Y., president of the National Association of Soil Conservation Districts, praised the Louisiana State government for its wisdom in appropriating \$800,000 to help districts carry on their work. He also commended the bankers for their interest in soil conservation. He was introduced by W. T. Nolin, president of the Louisiana Association of Soil Conservation District Supervisors.

Lt. Gov. William J. Dodd of Louisiana said of the 43 farmers receiving certificates of merit: "Well done, good and faithful servants."

E. T. Powell, chairman of the D'Arbonne District board of supervisors, told the audience that since the district began operations cooperating farmers had planted cover crops on 57,026 acres, seeded 20,478 acres to improve pastures, planted pine trees on 8,000 acres, practiced conservation management on 32,058 acres of farm woodlands and selective tree cutting on 19,970 acres, and built 327 stock ponds and 4,600 miles of terraces. There are conservation plans on 2,129 district farms covering 302,315 acres.

—S. RAY AYCOCK.

NORTHERN GREAT PLAINS

SOLD ON GRASS-LEGUME MIXTURES.—Edwin W. Aune, near Wilton, N. Dak., finds that grass-legume mixtures in the crop rotation more than pay their way.

"Last year," he said, "I got a cash income of \$25 and 2½ tons of hay from an acre of cropland that had been seeded to brome grass and alfalfa. Aside from the original seeding, the only expense was the two harvesting operations. Net income per acre was the highest of any field on the farm."

Aune explained this field was seeded to fit in with his program of including grass-legume mixtures in the crop rotation on his 240-acre farm. This was but one of the conservation measures included in the farm conservation plan he worked out with the help of Clifford G. Wahl, SCS technician.

STOPPED THE BLOWING.—If you're going to farm light land successfully you'd better figure on stubble-mulch tillage, strip cropping, and shelter belts and get a land capability survey so that you won't try to farm land you'd better leave in grass.

Alfred Hochgraber, near Galesburg, N. Dak., a cooperator with the West Traill County Soil Conservation District, started from scratch 4 years ago on a section of land that was in grass. Except for a low area, into which the rest of the farm drains, all of the section was broken out.

"Part of the farm is pretty sandy," he said. "I knew I'd have to strip-crop and probably plant windbreaks, but I thought I could get by with block farming for a few years on new land. But I found out differently. The sandy parts of the farm blew. And then, crops didn't do much on another part of the farm."

He started cooperating with the soil conservation district and, with the help of Allen Fick of SCS, worked out his present farm conservation plan. He learned that the land that produced poorly was too salty for crops and that proper drainage would improve the rest of the heavier land.

Technicians designed a drainage system to clear the heavier land more rapidly and spread the water on native pasture. They laid out a farmstead windbreak and a series of shelter belts on the sandy land, and helped set up a strip-cropping system which will be established in 1950. Hochgraber is starting to use grass in the crop rotation.

He will farm in strips with stubble-mulch tillage on the lighter land. In 1948 he built the drainage system and planted the farmstead windbreak and two of the shelter belts. He planted more shelter belts in 1949 and summer-fallowed the sites for 1950 plantings.

He explained that he has found it necessary to change his stubble-mulch tillage system somewhat from the way he started out. He used to plow in fall, then in spring drag the straw back to the surface. He has now learned it is necessary to keep the stubble and straw on the surface during the winter, too. That means starting stubble-mulch tillage in the fall.

GRASSLAND NEEDED PROTECTION, TOO.—Usually diversions are built to protect cropland from the runoff from grassland farther up the slope, but on the farm of Orville Childs near Belleville, Kans., conservation on the cropland is protecting his grassland. Childs is a cooperator with the Republic County Soil Conservation District.

A large steep-sided draw crosses the farm and receives the drainage from a large area. The deep draw with steep banks runs through the pasture below the cropland. The cropland is on the more gently sloping upland.

"People say that grassland won't gully if you keep it well covered," Childs said, "but it will gully here. The cropland was gullyng, too."

Childs started cooperation with the soil conservation district in 1946, getting Roy D. Crist of SCS to work out his conservation plan. The land capability survey showed that little change in land use was needed.

The plan includes grassed waterways to dispose of excess water safely, terracing and contour farming, inclusion of grass and legumes in the long-time crop rotation, and improved pasture management.

Childs pointed out that water from the cropland came straight downhill and concentrated into small streams which plunged over the bank and damaged the grassland.

Now, contours hold a lot of the water where it falls and the terraces break the slope into several short stretches so that the water which the contours cannot hold doesn't get a chance to form into streams.

The terraces carry the water slowly to places where waterways were built and can let the excess water down into the drainage with safety. The smaller gullies that had been cut by the water have healed over and the big gully is healing rapidly. Grass is beginning to creep down the sides.

TAKING A LOOK AT THE ROOTS.—Large groups of Emery County, Utah, landowners have been visiting the farm of Ed Bringerhoff near Lawrence this fall to view a plot where SCS technicians are demonstrating methods of determining the most beneficial amount of water to apply to soils in this area.

Roots of most plants gather water from the soil within the first 3 feet and therefore it is folly to irrigate deeper than the penetration depth of roots, which varies for different plants. Not only is too-deep irrigation wasteful of water, but it also carries the soluble plant food too deep into the soil, putting it beyond reach.

Marvin Barney, soil scientist, shows charts depicting the root systems of various field crops and explains the advantages and disadvantages of different methods of irrigation. Emphasis is placed on the fact that proper irrigation practices are among the ways farmers can help to save the topsoil that makes the difference between profit and loss.

SOUTHWEST

EQUIPMENT COSTS.—Ten cents a cubic yard is the average cost of moving earth to level land in the Gila Valley Soil Conservation District, Ariz. But it is some-

times done with district-owned equipment for as little as 8½ cents.

This is the only Arizona district that has gone in for equipment ownership and operation in a big way. That end of its activities involves much serious planning and sound administration, because so much money is involved.

In 1948 rentals on district equipment came to \$40,138. Wages of the superintendent who looks after it and the men who operate it totaled \$13,134. Outlay for repairs was \$7,164; for fuel and oil, \$4,090. Industrial insurance alone ran to \$699. There were other smaller items, too.

Any of the 300-odd farmers who work the 35,000 acres of cultivated land in Graham is eligible to rent the equipment after applications have been approved by the board of supervisors and the necessary engineering has been done by technicians of the Soil Conservation Service. Actually, 187 farmers with 20,900 acres are cooperating. This isn't to say that the others are not carrying on soil and water conservation practices; many are doing so but without SCS technical assistance and without any formal agreements with the district.

Rental rates, on an hourly basis, have been the same for the last 3 years. Since every job is checked by SCS, it is easy to figure costs on a basis of actual accomplishment. Those records show that land leveling ranges from 8½ to 12 cents per cubic yard of earth moved, and the average is 10 cents.

When the district made heavy machinery available, it was for the first time possible for Graham farmers to engage in conservation measures at a cost they could afford. When a few examples had shown how much water could be saved and how much better crops could be grown, there was far more work to be done than could possibly be done with district equipment. So private contractors moved in to take up the slack, and district costs have served as a yardstick to hold charges in line.

PRACTICAL TIPS ON PLANTING GRASS SEED.—

Farmers and ranchers in New Mexico's Roosevelt and Border Soil Conservation Districts are constantly on the lookout for the best means of planting grass seed.

Interest in methods and machines has become widespread because farmers are planning to retire to permanent pasture thousands of acres now in cultivation. They believe grass to be the most profitable crop on those fields which are subject to erosion.

Bert Roy, district farmer about a mile north of Rogers, has developed a grass-seed planter which has given him excellent results.

Roy says his machine is a simple planter which any farmer or group of farmers should be able to assemble and operate. It is equipped with eight regular lister beams on a tool bar, spaced 20 inches apart. An 8-inch furrow opener that will make a furrow large enough to hold the average rainfall in this area is attached to each beam. A special-type seed dropper which cost \$2 has been installed in each of the four planter boxes on the machine.

Roy explains that the droppers can be adjusted to plant any desired rate of lovegrass seed per acre. A tin divider is located directly under the seed boxes so that

half of the seed can be diverted into each of two rows, thus planting eight rows at a time. A burlap bag containing about 15 pounds of dirt is dragged along each furrow to cover the seed. He has found that he can seed between 40 and 50 acres a day with this machine.

Roy completed the planting of weeping lovegrass on 480 acres of old cultivated fields early last July, using 1 pound of seed per acre. He planted the entire acreage on the contour. The contour furrows caught and held most of the rain where it fell, and the grass made an excellent stand.

Weeds grew from 2 to 3 feet high over most of the field, as is usually the case with lovegrass plantings. These weeds shaded and protected the small grass plants in the furrows. When the weeds were killed by frost in the fall they were allowed to remain as protection against wind erosion and to hold snow on the field during the winter.

Soil Conservation Service technicians working with the Border and Roosevelt Soil Conservation Districts report that farmers and ranchers who have made lovegrass plantings in furrows have had much better success than where the seed was broadcast on flat lands.

GETTING THE LAND READY.—Land preparation and special tillage operations were demonstrated last fall to 100 farmers, bankers, and businessmen on the Lois White farm near Spanish Fork, Utah, in the Nebo Soil Conservation District. The purpose was to show how land which has been packed by the use of heavy machinery in land leveling operations can be loosened to stop erosion, permit penetration of irrigation water, and increase crop production.

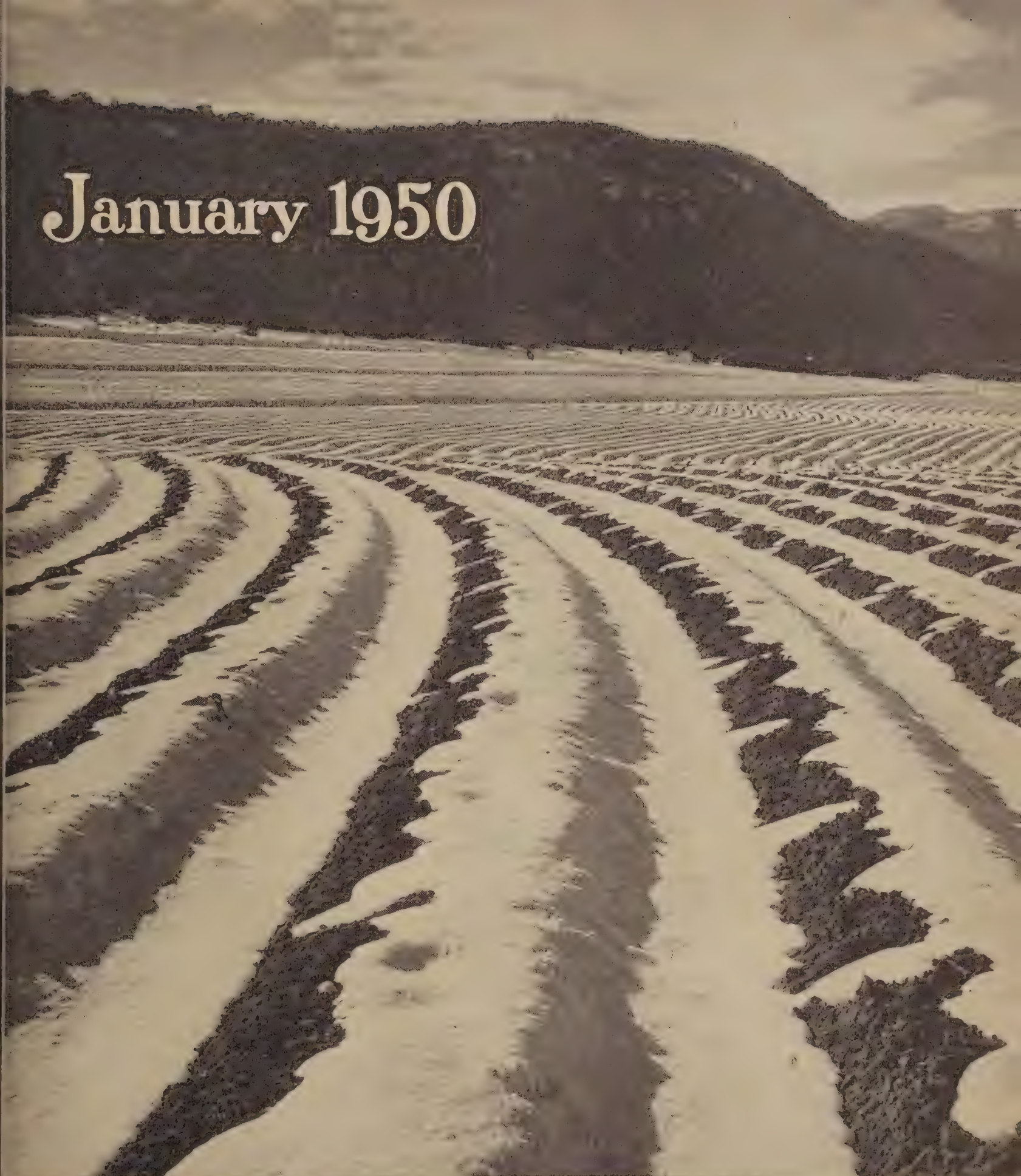
Technicians discussed leveling and land preparation in its various phases. Equipment-concern representatives explained the use of each piece of machinery.

THREE COLORADO FARMS TRANSFORMED.—Almost every type of soil and water conservation practice necessary for efficient and profitable farming in Fremont County, Colo., was seen by more than 2,000 persons who attended the "Save Our Soil" demonstration sponsored by the Fremont Soil Conservation District near Canon City last September.

Land leveling for better distribution of irrigation water was included. There was also plowing under of green manure crops to add organic matter to the soil, drainage to reclaim and make better use of bottom lands, bank sloping and streambank protection, irrigation structures to control the flow of irrigation water, numerous irrigation methods, and the establishment of wildlife areas.

The demonstration was held on the adjoining farms of J. G. Shoun, T. E. Cook, and M. A. Colon, cooperators of the district. Certain practices were applied well in advance, and others were carried out during the day.

Local farm implement dealers donated the use of machinery and also set up one of the largest equipment displays ever seen in this part of the country. A huge machinery parade was staged in Canon City the afternoon before the demonstration, followed by a community square dance. Members of 4-H Clubs served a barbecue dinner.

An aerial photograph of a large agricultural field with distinct, curved rows of crops, likely corn, stretching towards a dark, forested hill in the background. The field is divided into long, winding strips of dark soil and lighter-colored furrows.

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SECRETARY OF AGRICULTURE

HUGH H. BENNETT

CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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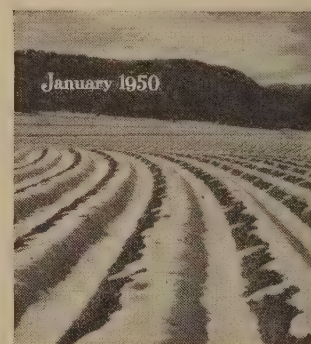
COST CAN BE COUNTED.—September 15 was a red-letter day at the Jackson County farm near Ripley, W. Va.

On that day, a crowd estimated at 12,000 looked on while a working force of 300 men applied a complete face lifting that covered all of the practices recommended for proper land use.

At current labor, material, and fertilizer costs, the bill for the day's work would have been \$8,047. But it didn't actually cost anything like that. Equipment dealers donated the machinery. Feed stores and individuals paid for the seed, lime, and fertilizer. The workers donated their services. It was a grand demonstration, not only of what should be done to farm land but of real community effort.

It was a demonstration broken down in such a way that those farm operators who might want to apply some of the improve-

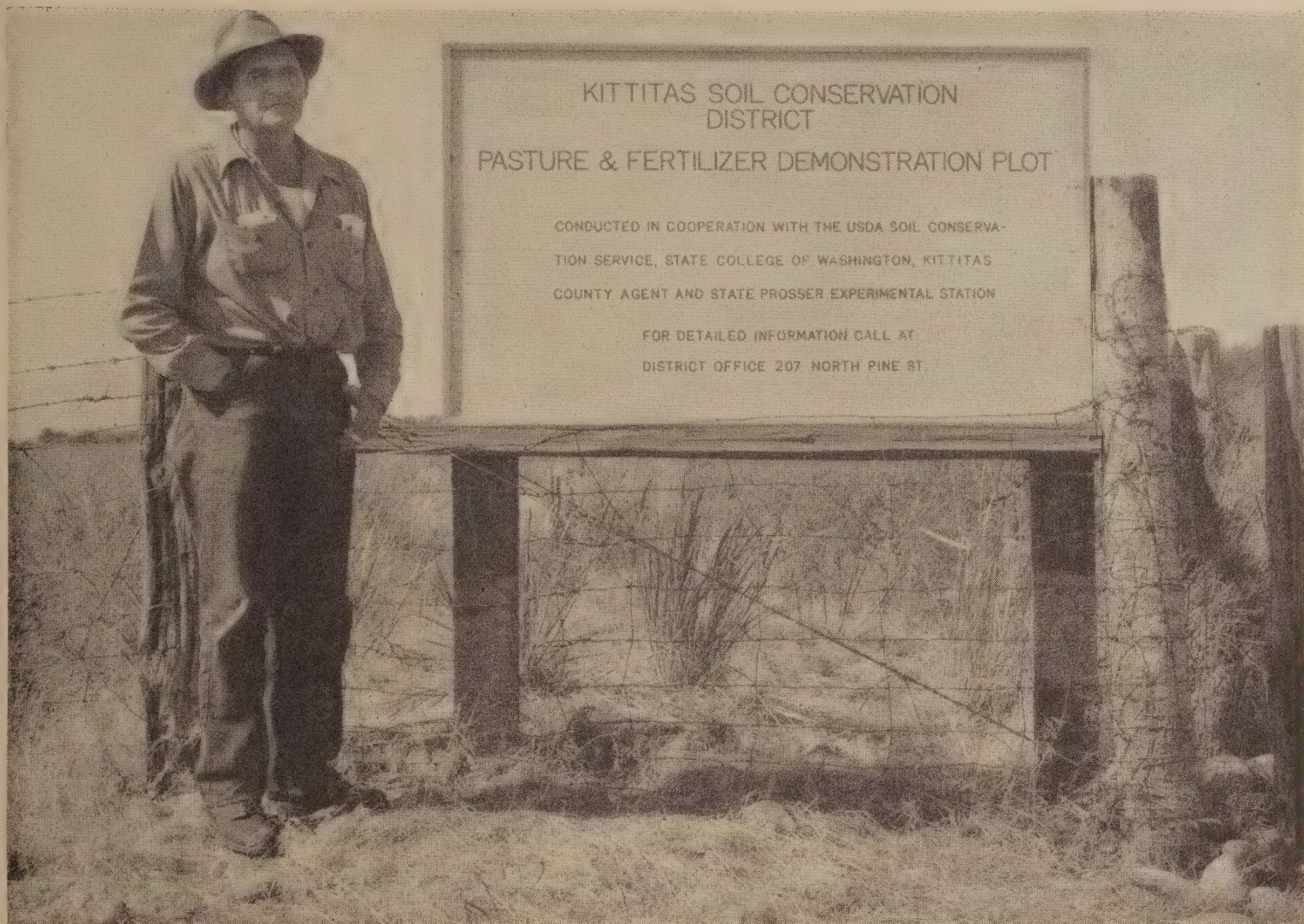
(Continued on page 141)



FRONT COVER.—Contour cultivation holds the snow in Bernalillo County, N. Mex. Plowing on the contour prevents flooding and insures equal distribution of water when it rains. Each furrow acts as a dam across the slope, lets the moisture seep in slowly for storage until needed. Photo by E. R. Wellington.

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PASTURE ON DISPLAY



District Chairman Bob Rutter is mighty proud of this sign and what it represents.

By **CARROLL H. DWYER** and
ARTHUR E. MILLER

R. L. (BOB) RUTTER, State senator in Washington and former vice president of the National Association of Soil Conservation Districts, is given to saying:

"We hear a lot these days about 'group action' and 'grass roots' programs. Here in Kittitas County in central Washington we have practiced group action for many years. As a group we got together and made Ellensburg known throughout the country as the home of the Ellensburg Rodeo, one of the country's 'Big Four.' As a group we organized the Kittitas Soil Conservation District. The district board of supervisors, as a group, spon-

sored a pasture demonstration which proved that we could produce 650 pounds of beef per acre on pasture."

There is quite a story behind those few words. In 1945 the Soil Conservation Service made a study of a number of pastures in the valley. This study showed rather discouraging results as most of the irrigated pastures were carrying only one-half to one animal unit per acre. The farmers were getting 150 to 200 pounds of beef per acre during the pasture season.

At one of the monthly board meetings Alan Rogers, a board member and now head of the public relations committee of the National Livestock Association, said: "I know from my own experience that good pastures provide the cheapest way of putting meat on cattle. However, I know that farmers in this valley are not getting as much profit from their pastures as they should.

NOTE.—The authors are, respectively, soil conservationist, water conservation division, Soil Conservation Service, Portland, Oreg., and work unit conservationist, Soil Conservation Service, Ellensburg, Wash.

What we need to know is—what will a good pasture produce, and how much will it cost? We need a good pasture demonstration!”

That started a train of thought. It was found that about a third of the irrigated land in the valley was used for pastures. Most of it was on classes III, IV, or VI land. Too often if land wasn't good for anything else, it was used for pasture. Still, irrigation water for pasture cost as much as water for potatoes or corn. If good pastures were to be established, it was necessary to show the farmers that they were both possible and profitable.

The board decided to sponsor an improved pasture demonstration. It didn't want just some small plots, but a pasture that approximated those used by most of the cooperators. Late in the fall of 1945 it rented a 41-acre tract for 5 years. The land was in pretty sorry shape. About half of it had been used for grain that year and was badly infested with quack grass. A couple of acres were tulle swamp and about 15 acres more were too wet to plow. The field contained about 6 acres of gravel bars. The Soil Conservation Service mapped the field as classes III and IV land.

Bob Rutter says, “We decided to go ‘whole hog’ and really see if we could grow a good pasture. We requested the Soil Conservation Service, the county agent, and the State College of Washington to help set up a working plan. On the basis of the ensuing suggestions, we decided to install drains, level the land, prepare a good seedbed, and plant a recommended pasture mixture.

“The Soil Conservation Service placed Arthur E. Miller in charge of the technical phases. The SCS also gave us invaluable help in laying out the drains, in land leveling, and in installing the irrigation system. It furnished the pasture seed.

“We decided to divide the pasture into four fields of equal size and to rotate the grazing. Pasture management practices, such as fertilization, clipping, and the spreading of droppings, would be carefully followed. Particular care would be taken to leave adequate cover for winter protection.”

During the spring and summer of 1946 drains were dug and the fields worked 7 to 18 times to kill grass. The fields were leveled, the irrigation system installed, and the pastures seeded. Complete cost records were kept. Total costs of drainage, leveling, land preparation, and seeding added up about like this:

	Cost per acre (dollars)	Total cost (dollars)
Drainage.....	16. 17	633. 10
Land leveling.....	18. 72	767. 50
Irrigation structures.....	1. 50	61. 56
Cross fencing.....	1. 20	49. 06
Land preparation, seed, seeding, and ditching.....	46. 51	1, 907. 22
Total.....	84. 10	3, 418. 44

The whole pasture was given 300 pounds of 18-percent superphosphate per acre at time of seeding. One-half of each field was given 300 pounds of 18-percent superphosphate per acre in 1947 to study the effects of fertilizer.

In 1947 the pasture seedings came through the winter in good shape. The fields were clipped to get rid of annual weeds. The first crop was cut for hay so that the seeding could become well established. The hay crop amounted to about 66 tons. The pastures were grazed lightly during the latter part of the season. Fifty head of Hereford steers were grazed 4,350 steer-days on the 41 acres. They gained 8,650 pounds, or an average gain of 1.97 per steer per day.

In 1948 the pasture was ready for use 10 days to 2 weeks earlier than other pastures in the valley. Sixty head of yearling grade Hereford steers were turned on it April 23, and 40 head were added a couple weeks later. During the pasture season of April 22 to September 24 (154 days) an average of 79 steers was grazed on the 41 acres. The pasture provided 12,170 steer-days of grazing and produced total gains of 26,530 pounds. The average beef produced per acre was 647 pounds. The average daily gain per steer was 2.18 pounds. The pasture produced an average of 297 steer-days of grazing per acre.

How did these results compare with the native pastures? Relatively good records are available on unimproved native pastures and partially improved and properly managed native pastures. These records (shown in a table) speak for themselves.

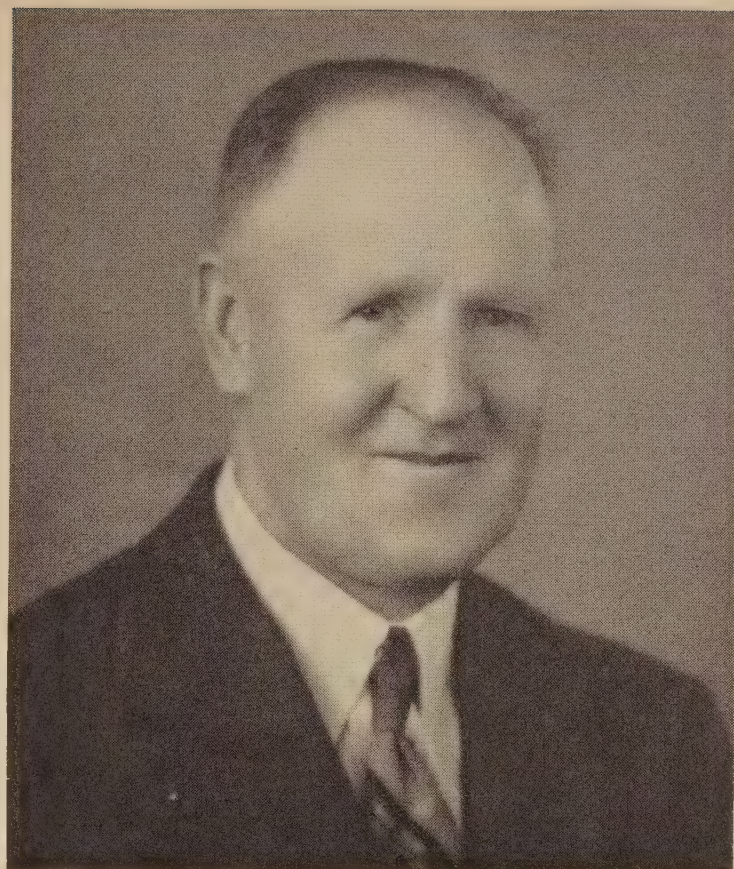
The district board of supervisors summarizes the demonstration as follows:

“What has the demonstration pasture meant to the Kittitas Soil Conservation District? We believe that the Ellensburg Valley is in a fair way of becoming well known for two things now—its rodeo and as the home of the best irrigated

Comparison of pasture yields

Item	Unimproved native pasture	Partially improved native pasture	Demonstration pasture
Average steers per acre.....number..	1.1	1.6	2.0
Average daily gains per steer.pounds..	1.5	1.69	2.18
Total gain per acre.....do.....	200-250	437	647
Average cost per 100-pound gain dollars..	10.37	7.42	6.47

pastures in the State. The pasture has proved to us, and to the farmers of the valley, that excellent pastures can be grown, and, if properly managed, are one of our most profitable crops. A visit to the pasture has been a 'must' for ranchers and cattlemen from near and far. So far this year the district board has received requests for assistance in establishing pastures 'just like the district's' on over 3,000 acres. This is only a beginning. We like to think of our district board's sponsorship of this demonstration with the cooperation of State and Federal agencies as 'democracy at the grass roots.'"



E. S. Gardner.

DISTRICT PROFILE

GARDNER
of
UTAH

That sandy-haired, unassuming rancher from Utah's "Dixie Land," who for the past 2 years has done such an outstanding job as president of the Utah Soil Conservation Districts Association, is E. S. Gardner of Pine Valley.

"Ras" is a native son. He comes from pioneer stock, his father, Rueben, having been one of the early cattle raisers of southwestern Utah.

After receiving his education at Branch Agricultural College, Cedar City, and Utah State Agricultural College, Logan, Ras went back to the ranch at Pine Valley to help his father with the cattle business. There he became one of the first breeders of pure bred Herefords in southern Utah.

He has remained there ever since and is now one of the most successful raisers of registered Hereford cattle in southwestern Utah. He also has a commercial herd of grade Herefords.

Besides raising whiteface cattle, Ras operates 120 acres of irrigated cropland and 1,000 acres of pasture and grazing land. This farm is operated in conjunction with his cattle business.

Picturesque Pine Valley has an elevation of 6,400 feet, being situated in the headwaters of Santa Clara Creek. It is bounded on all sides by the Dixie National Forest.

To augment his private range holdings (common practice in the Western States) Ras grazes some of his cattle in the summer on National Forest lands and in the winter on Bureau of Land Management lands. He has owned cattle permits on Federal range since going in the cattle business.

Ras and his wife, Maude, have been married 32 years. They have two girls and one boy. Their son, Dean, served in the armed forces during World War II and is now working with his father on the ranch.

Community service and civic leadership were characteristics of Ras a long time before he became interested in soil conservation districts. He acted as president of the Santa Clara Water Users' Association several years and served 6 years as representative of Washington County in the Utah State Legislature. He is now a member of the Utah Legislative Council.

Ras has been an ardent church man all of his life, a member of the Church of Jesus Christ of Latter Day Saints. He has held many positions in the church and served as ward bishop of the Pine Valley ward 13 years.

The soil conservation district act was passed by the Utah State Legislature in 1937. The Lower Virgin-Santa Clara District was organized in 1938 and received its certificate of organization in January 1939. Gardner was instrumental in organizing this district and was elected as a supervisor on the district's first board. Since then he has been reelected twice and has served his community as a supervisor 10 years.

While in the Utah State Legislature during the early days of conservation in Utah, he took an active part in formulating necessary legislation to further the district program.

He also appeared before the agricultural committee of the United States House of Representatives to outline his views and the desires of his organization for constructive soil conservation legislation.

Ras is a firm believer in the district movement and never misses a chance to emphasize the importance of keeping the control of the soil and moisture conservation program in the hands of local farmers and ranchers.

He has been very active in preaching the various aspects of the complete conservation program to his neighbors and to all with whom he comes in contact. Not only does he preach but he also practices what he preaches.

In February 1948 at the annual meeting of soil conservation district supervisors, Ras was elected president of the State organization. Under his leadership, the State association was formally organized. Representatives from the various sections of the State were elected and articles of association were drawn up and adopted. Under his guidance this organization has a position of prominence in State affairs.

Ras is a very busy man. In addition to his conservation activities, he is vice president of the Utah Cattle and Horse Growers' Association and has the distinction of representing his section of the United States as a member of the executive committee of the American Livestock Association. He is also a director in the Bank of St. George. It takes a busy man to get things done, and done right.

—A. J. WEBBER.

HIGH-VELOCITY OUTLET CHANNELS

By H. G. BOBST

SAFE TRANSPORTATION of water in natural or man-made channels is a major engineering problem. It requires maintenance of a velocity that permits neither scouring of bottom or banks of the channel nor deposition of silt. The problem is the same whether the channel is a major stream or an outlet carrying water from a terrace system, for the same basic laws of hydrology apply.

The problem resolves itself into one of providing disposal channels for surplus water from farms at a cost that farmers can afford. Mostly, this is accomplished by designing channels that can be protected adequately by grass. But there are places where grass alone has not been enough because the slope is too steep, the soil too low in fertility, the quantity of water too large, or a combination of these and other factors.

Ten years' observation of three concrete, high-velocity channels in terrace outlets, or grassed waterways, in Nebraska indicate that they offer a satisfactory solution to this situation. They have the advantage over the more conventional drop systems of being within the farmer's ability to finance. They are less susceptible to weather and rodent damage, and they need to be large enough to handle only part of the flow in the outlet.

My first acquaintance with the failure of grass to give adequate protection to grassed outlet channels came when I was project manager of the Box Elder demonstration project in Douglas County, Nebr., from 1935 to 1937.

Observation of a number of waterways convinced me that it was not the large discharge of water down the channels that caused most of the trouble. Instead, it appeared that small, continuous flows lasting days or weeks were principally responsible. These first killed the grass; then, as later rains caused flows, the water cut gullies where the grass had been destroyed.

A need was indicated for some method of taking care of a small part of the total expected discharge in a protected channel without setting up undue turbulence. It was also evident that if this could

NOTE.—The author is assistant State conservationist, Soil Conservation Service, Salina, Kans.

be done, grass could be expected to protect the rest of the outlet, even on steeper slopes than was then considered possible.

Three concrete high-velocity channels were built to try out this theory. Two were built by CCC camps in 1939 while I was in charge of CCC-SCS work in the Northern Great Plains. One is on the John Rakosnik farm near Pawnee City, Nebr., and the other on a farm 2 miles west of Franklin, Nebr. The third, on the Harold Shackleton farm near Pawnee City, was built in 1943 by a camp at Weeping Water.

The waterway on the Rakosnik farm replaced an active gully on a slope leading to a creek with high, precipitous banks. Built on a 7.24-percent slope, the upper end of the channel is at the lower end of a terrace outlet and extends down to the flow line of the creek. The channel is of concrete, V-shaped, 225 feet long, 1 foot deep and with an over-all width of 4 feet, and located exactly in the middle of the waterway.

Shaped to a 5-percent slope from either edge to the channel, the whole waterway's cross section is a flat V with the high-velocity channel in the center. The channel was formed in 20-foot sections, with hog wire for reinforcing and a concrete slab 4 inches thick. A cut-off was provided for each section and standard expansion joint material was used. The waterway was sodded with bluegrass.

A total of 31 acres, with the cropland terraced, drains into this waterway. Total maximum discharge was calculated to be 82 cubic feet per second, and the high-velocity channel was planned to handle 32 cubic feet per second, or 40 percent of the maximum expected discharge.

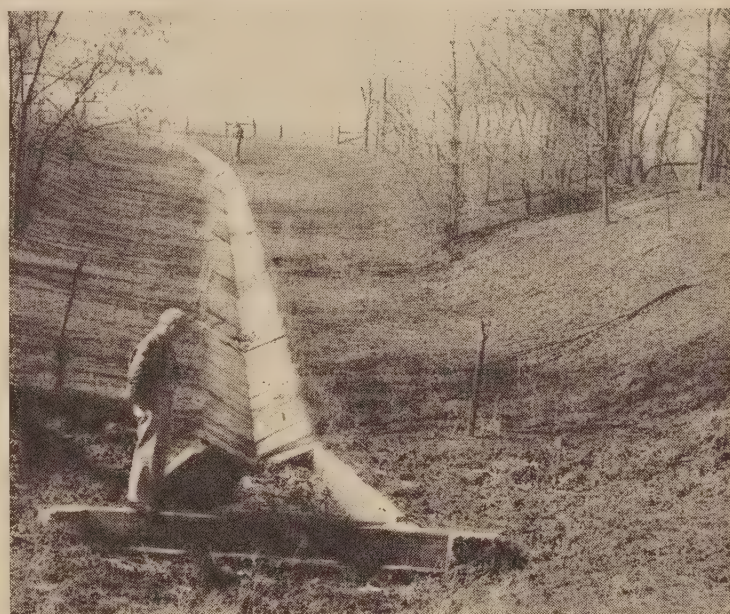
An examination this spring showed that no erosion has occurred along the whole length of the channel, although the waterway has been heavily grazed and water has flowed over the grass section of the waterway as well as in the channel high-velocity section. This structure has had no maintenance since it was built.

The cross section of both the high-velocity channel and grassed waterway near Franklin, Nebr., are the same as Rakosnik's, but it has a variable grade. The upper part has a 6-percent grade, breaks off sharply to a 10-percent slope, then flattens out to 6 percent at the lower end. The waterway was sodded with western wheatgrass.

That waterway is a field-side outlet along the



Two views of the waterway and high-velocity channel on the John Rakosnik farm near Pawnee City, Nebr., in the Turkey Creek Soil Conservation District. The 1939 view is of the gully caused by runoff from the land above; the lower picture tells how it looks today. The waterway has been heavily grazed without sign of damage, although it has had no maintenance.



property line, designed to take the water from the terraces on two farms. One farm was never terraced, however, so the waterway has never had over 15 acres of drainage.

After 10 years, this channel is in excellent condition, and the western wheatgrass has shingled down over the edge so that the channel is almost obscured from view. Although not subject to very heavy flows, it has demonstrated stability under freezing and thawing conditions, and there has been no rodent damage.

The channel built on the Shackleton farm near Pawnee City has a trapezoidal cross section 1 foot deep, 9 inches wide at the bottom, and with one-

to-one side slopes. The concrete is 4 inches thick. It is 118 feet long, and expansion joints and collars are provided for each 20-foot section. The cross section of the waterway is the same as the others. Slough grass was started adjacent to the concrete channel, and brome grass on the rest of the waterway.

This channel differs from the others in that it is the lower end of the spillway of a farm pond. The drainage area is 52 acres, of which 40 are terraced and 14 are pasture. Computed for a 15-year frequency, the maximum discharge to be expected was calculated to be 150 cubic feet per second. The concrete channel's capacity is 36 cubic feet per second, or 24 percent of the maximum discharge expected.

Because of exceptional cooperation by the farmer, more information has been obtained from this channel than from the others. In 1947, for example, Shackleton, after a heavy rain, couldn't cross the spillway at the end of the dam without the water topping his knee boots—about 2 feet deep, he estimated. Yet, he found that down from about 20 feet below the upper end of concrete channel all the flow was contained in the structure.

Besides being cheaper, these structures are superior to drop structures for this purpose, in my opinion. Drop structures let water down in vertical steps, and must be carefully designed and built. Further, they must be large enough to take the maximum expected discharge because overtopping will create turbulence and cause them to fail. And in addition, they are susceptible to

damage from frost action and burrowing rodents.

No one knows, of course, whether the maximum expected discharge from the areas above these channels has ever occurred, but there have been numerous violent storms. During the years that the channels have been in place they have stood up with little maintenance, if any, under changing climatic conditions and have not suffered rodent damage. They have withstood trampling by livestock. And they have handled the trickle flows, thereby protecting the rest of the waterway so that the grass can be kept thrifty for the time when the flood flow overtops the concrete channel.

The cost of these channels was relatively high because the work was done by hand. It is conceivable, though, that small contractors can equip themselves with shapers and forms and build such channels at a cost well within the reach of the farmers. The years of observation have also convinced me that a channel of this type may have a capacity as low as 15 percent of the maximum expected discharge and still give adequate protection.

High-velocity channels are not intended to substitute for grass. There is an old adage among construction men: "Never send tracks where wheels will go." Paraphrased for the Soil Conservation Service, it would be: "Never use concrete where grass will do." But when we do have a place where grass will not do, we need a practical, long-life structure that will stand up under the conditions on an average farm. These channels give promise of filling the bill.

PEOPLE WORKING TOGETHER

By HUGH BENNETT

PEOPLE normally do things together and live in close contact with one another. This we have known all along, but in soil conservation we had made little use of the potentialities involved with this human characteristic until the advent of the soil conservation districts.

People live together in villages and cities; and we take it for granted they like to live that way and let it go at that, with little thought of the complications and forces involved with such gregarious ways of life. In urban areas people join one another in countless activities relating to their general welfare. They help one another in the

maintenance of streets, water supply, fire protection, police protection. They build public hospitals, operate schools, and maintain libraries, parks, and zoos for the benefit of all. In some countries great walls have been built around cities as a means of protection from banditry and invasion.

These joint actions appear to conform to the natural behavior of humans, like bees, ants, and wasps living together, working together, defending their home places together, and accomplishing much more than on an individual basis.

Similarly, people do many things together in rural areas more or less for the same general purposes. In communities they join one another in the operation of schools and churches; they



The American way: Farmers vote on proposed creation of new soil conservation district, Johnson County Courthouse, Ga.

sign joint petitions for help in the building and maintenance of roads and schoolhouses and in procuring the services of school buses and highway patrolmen. In other words, they help one another by working together.

Here again the guiding force is of the natural order. There is even less evidence of force through man-made laws on farms than in cities. That is to say, there is less artificiality and more naturalness in the ways of farm life.

In rural areas we find group action of a still another environmental pattern. The activities of people working together in more or less compact rural areas takes the form of an even greater naturalness than in cities, approaching almost instinctive action. I have reference to relatively small groups of neighbors, whose members often are unaware of the neighborliness enjoyed in their mode of living. They work together in ways that they themselves do not always realize. They have their leaders, for example—leaders who are neither appointed nor elected. These are simply locally outstanding men who have won the confidence of their neighbors and to whom their neighbors turn for advice with respect to both their individual and mutual interests.

A variety of neighborly forces bind these small groups together. Sometimes church interests

serve as the catalytic agent, or the school, or other kinds of meetings among themselves. Picnics and baseball games are examples of the neighborliness sometimes met with in these neighborhoods. Probably common needs, especially in the form of emergencies, bring the members of such groups closer together than all other influences—emergencies like sickness, fires, floods, drought, livestock epidemics. Often they come together to help one another slaughter, dip cattle, or round up livestock. Old-fashioned quilting parties passed out years ago, as did corn huskings and “log rollings.” Plowing contests today are giving way to “farm face liftings,” and terracing matches (the latter, however, are more characteristic of larger groups, as community groups and large artificial groups like soil-conservation districts).

What is of greatest importance to conservationists is the fact that these groups, small and large, can be located, their members and leaders identified, and their demonstrated willingness to work together advantageously utilized through joint action in the furtherance of soil and water conservation. This last fact accounts for our latest method of speeding up soil conservation. At this time the Soil Conservation Service is cooperating with probably 30,000 of these neighbor groups—and with much success. We are having varied ex-

periences in working with these small neighbor groups, but in the great majority of cases we are getting along admirably with the method.

Recently in Michigan, I asked a farmer, after looking over the soil conservation work on his farm which had attracted some considerable attention throughout the local soil conservation district, if the other farmers of the neighborhood had taken up any of the kind of work he had carried out. His reply was that very little had been done locally. "Farmers around here," he said, "stand back and watch the work of others until they have made up their own minds as to whether or not they like it and want it."

Then I asked him if there might not be a possibility of the others of the neighborhood getting together and discussing conservation matters with the view of helping one another push ahead with the work or of gradually developing such an inclination.

"No," he replied, "we'll just have to wait for them to make up their minds themselves. The farmer over there across the road refuses to work with the local soil conservation district or with the technicians of the Service. He's a good man, too; just inclined for reasons of his own to lay hands off anything the Government proposes."

"Do you have anywhere around here," I then inquired, "anything on the order of a neighborhood group?"

"I am afraid not; but they have them south of here," he said.

"No picnicking, no getting together to discuss school or church matters, nothing of that kind?"

"No."

"Don't you have something of the old-fashioned neighborhood spirit and action among the people hereabouts?"

"No, sir; there is nothing of that kind here any more. Part of our children go to the consolidated school to the north of here, by bus; the others go to another school south of here. We just leave school matters entirely in the hands of our school authorities."

"You said your neighbor across the road is a good man; why do you feel that way about him?"

"That fellow—why he would lend me any of his farm machinery if he found out I was in a tight place here on my own farm! Sure, he's a good man."

I made no further inquiry. I was not there to locate a neighbor group but to inspect soil con-

servation work. I was convinced, however, by this last remark, that I had been talking to a member of a more or less typical neighbor group of the kind that had not yet come to recognize its own existence. When a farmer is willing to help his neighbor in a pinch with his farm machinery, most likely he would help him also in case of sickness, or fire, or any other similar neighborhood matter. And, further, I am convinced that other farmers of the same neighborhood would likewise cooperate with one another in matters affecting the group's welfare. However, even two farmers can help one another in the kind of small group action I have in mind. Some of the groups we are currently working with include only two or three farmers.

Later, in Indiana, I saw a number of groups in action, small and large, and talked with some of them about their progress in soil conservation. I think you get a better understanding of local problems and how they can best be handled when you confer with groups of farmers. That way you get more into the details of what the farmers really think.

Everybody I talked with seemed to like the group approach for getting soil conservation on the land in time.

Perhaps the most outstanding thing I ran into in the State was a little roadside conference we had with some 10 or 15 farmers who by prearrangement had gathered in an area which had been markedly improved by drainage. This was along the Dismal Ditch, in Tippecanoe County. That little gathering struck me as an ideal sort of get-together for discussing soil conservation work. It differed from somewhat similar gatherings in that a place was selected where you could see what had been done and talk about it more understandingly.

There were soil conservation district supervisors and farmers working as a community group in a soil conservation district. Another unusual feature was that a banker was present. One of the points discussed had to do with the fact that these people had first employed a lawyer to help them develop legal ways and means for making assessments and paying for the drainage work. It seemed that about all they had ever derived from their efforts with the law was an occasional bill from their lawyer—which usually amounted to around \$300. Disgusted with their failure to get anywhere, the group sent one of its members to the courthouse at LaFayette to find out how they

could detach themselves from the entanglements they had gotten into by what they had done. In other words, they wanted the drainage proposal turned back to themselves. As I recall, it cost \$5 to get out the clutches of man-made law.

The next step on their part was to visit all the 52 farmers within the area who would in any way benefit by the drainage, asking those who were willing to sign their names to a sort of gentlemen's agreement to pay what they could and should. This worked out very well, we were told, except that later on a few changed their minds in some measure with respect to final payments.

Following this, the drainage work was carried out with the assistance of the technicians of the Soil Conservation Service. At the time we were there, the job had been pretty well completed and some 2,500 acres had been benefited. The main crop, corn, was looking about as good as corn ever looks anywhere, it seemed to me. I recall asking one of the farmers how the drainage had benefited him. His reply was something like this:

"See that corn over there by the piles of willow brush? When do you think I made my last crop on that land?"

I ask when.

"It was in 1936."

He added that the land had been so wet all the intervening years, he couldn't get it planted in time or couldn't work it adequately, "and so, the willow trees grew up and had to be cut down, piled, and the land planted to corn."

The corn was looking like 100 bushels to the acre, maybe better. Then someone asked the banker what he thought about such an operation. His reply was something like this:

"At our bank in LaFayette, we think so well of this kind of work that we have set aside several thousand dollars for loans to farmers who will show us an agreement with the soil conservation district to carry on such work, provided he has a plan with the district made by the technicians of the Soil Conservation Service. We ask for no further endorsement than the operator's signature and no collateral. We charge no interest until the day the money is taken out of the bank to pay for operations."

Good banking sense, I think.

I was much interested in going over the farm of E. E. Cox, near Crawfordsville, Ind., operated jointly by himself and his tenant, Glenn Myers. They were operating on what they called a 50-50

basis. They divided the costs—all costs, even including taxes—and apparently were thoroughly pleased by the way things were going. It was not difficult to see that they had greatly benefited from the soil conservation work our technicians had helped them carry out through their local soil conservation district.

The landlord said: "I wouldn't farm under any other system but this conservation system we've been following."

Some of the results of conservation they gave us were as follows: The 3-year average per-acre yield of corn before starting the soil conservation program was 26 bushels. The farm at that time was able to carry 8 to 10 cows on its 240 acres. One of the principal fields—the barn field—after the conservation work had taken hold, produced 115 bushels of corn per acre last year and 123 bushels the year before. This field was strip-cropped, cultivated on the contour, and farmed under a rotation of alfalfa mixed with grass, with corn coming in about every 4 years.

The farm is now running close to 100 head of Guernsey cattle for milk production. "Formerly there were 2 or 3 brood sows and they ate pretty much the total production of the farm. There are now 30 brood sows to take care of the increased production of corn," Mr. Cox told us. "There were bad washes in some of the fields when I came out here 13 years ago. You couldn't get across them with a tractor. Now the gullies are gone, all of them, and in their place we are producing corn, alfalfa, grass, milk, and pork. We run 200 to 400 head of hogs most of the time, averaging around 300."

I asked landlord and tenant how they liked the conservation work that had been done on their farm. The landlord said: "I think this is the only kind of farming for a farmer to do. Right now the papers and radio are talking about going more into grass, legumes, and livestock. We are about 5 years ahead of this advice. At first I felt that if we had to farm by terracing and contouring, I would give someone a deed to the place, but I haven't given the place away yet, although some time ago a fellow offered me what he thought was a fancy price for this barn-field part of the farm. The price wasn't up to what I thought the tract was worth. "You know," Mr. Cox said, "tenant farmers who move every year looking for a better place to farm would be better off if they would just

(Continued on page 141)



McLaurin and Zachary contemplate the alfalfa planted as part of the conservation plan for Zachary's Ashe County N. C., farm.

By J. W. ZACHARY

I WAS ready to quit farming and go back to the coal mines 3 years ago. But about that time things started happening that make me glad I didn't.

When I left the Army in September 1946, I was all pepped up over the prospects of becoming a farmer. I had visited the farm a few times in my life, but I had no idea then what was in store for me.

It wasn't long after we got settled down until the long winter feeding of livestock began. That was when I almost went back to digging coal. There were corn and hay on the place, but we had to buy most of the feed used that winter. I decided then and there if I continued to farm I'd have enough feed for my livestock without having to buy it.

I would have gone back to the mines if Jim McLaurin of the SCS hadn't paid me a visit and

given me some encouragement. I knew nothing whatever about planning or operating a farm. I didn't even know how to put the harness on a horse. When I asked my neighbors for advice, some of them would laugh at me and some even went so far as to say I'd never make a farmer.

When McLaurin and I went over the farm together, I began to see it all in a different light. Some things I already knew about some of the fields would fit in with what he told me. Other facts he pointed out to me on the map he seemed to apply to each field as we came to it.

"This field is better suited for crops and that one for pasture," he would say. Or, "This field will grow alfalfa with the proper treatment, and that field is too wet for alfalfa but will grow Ladino clover."

After a round of the whole farm, field by field, we figured up the amount of land I would need for crops and pasture and compared it with the totals we had from each field. It was just what I wanted.

NOTE.—The author is a Grassy Creek farmer of Ashe County, N. C., in the New River Soil Conservation District.

My application for training in the Veterans' Farm Program was accepted, and I began to receive instruction in January 1948. The vocational agriculture teachers have helped me very much. One of them visits me about every 2 weeks and helps on almost any problem I have at the time.

These teachers tell when and how to plant certain crops, how to cultivate, and the best time to harvest. Such things may not seem important to one who has spent a lifetime on a farm, but to a person not familiar with farming they are of first priority.

I'm now growing all the feed I need for my livestock with the exception of some protein supplement for dairy cows. Last year I filled a 32-ton silo with corn grown on 1 acre of bottom land. Grown in contour strips on the hill, it made better than 70 bushels to the acre.

This year, I have given 1 acre of corn special attention in an attempt to produce 200 bushels on

it. I may not make that much, but I won't lose any money. Several people have estimated that I'll get well over 150 bushels on the acre.

One thing I'm sure of, and that is that I'll have enough grain, hay, and silage to feed all my livestock this winter.

I may never make a million dollars farming, but I'll get more than a million dollars' worth of satisfaction from trying.

GAS UNDER CONTROL.—By action of the Steuben County, N. Y., board of supervisors, a gas lease on county reforested lands has been granted with the provision that no well may be drilled without permission of the Steuben Soil Conservation District officials. Like action has been taken in adjoining Allegany County. This means that drilling operations must conform to soil conservation farm plans. It will prevent cutting up of the area with lease roads, and spoiling of the plantings, ponds, and other conservation measures installed under conservation farm plans. All leases in the two counties now carry this clause.



This is better than a coal mine, thinks J. W. Zachary (at right), as he and Jim McLaurin look out over the Grassy Creek land which he farms as a cooperator with the New River Soil Conservation District.

WILDLIFE MANAGEMENT THROUGH DISTRICTS IN NEW YORK

By BEN O. BRADLEY

THE late Aldo Leopole of Wisconsin—a forester by training—defined game management as the art of making land produce sustained annual crops of wild game for recreational use. The difficulty is that game is usually a secondary crop of the land, particularly on privately owned lands. And with the exception of our big game species, it is here that the bulk of our wildlife is found.

Obviously any proposal for game management on privately owned land must fit into the general management plan of that land. Otherwise, there will be no widespread acceptance of the measures by the owner. Actually, the requirements of food and cover for farm and wood-lot game can be met on most lands by ordinary farming practices. Good soil fertility and good crops are usually favorable to wildlife. Therefore, a program that is designed to maintain and improve the land for agriculture and forestry can be considered—with minor modifications—management for wildlife.

The task of the game manager is to foster the practices which should be encouraged. How to get them on the land for the benefit of the public has long been a stumbling block.

In New York, as well as other States, the opportunity of working with soil conservation districts to advance game management seems to offer much promise. The fact that these districts are set up to prepare complete farm conservation plans to assure the most desirable use of each acre makes a firm base from which to start. The game man can select those practices which will benefit wildlife and seek to get them applied.

Under New York conditions several recognized farm practices benefit wildlife by providing more food and cover. Foresters for years have encouraged landowners to plant trees. The Soil Conservation Service technicians find that nearly every farm has acreage that should be planted to trees. They provide a future timber and wood

supply to the owner and also furnish winter shelter to many species of wildlife. That is important in many parts of New York that are deficient in evergreens. Fencing of wood lots against grazing is considered important by foresters in managing the trees for best timber production. This practice is beneficial to wildlife in providing more ground cover for food and shelter. Hedges planted as living fences to control livestock are used by wildlife for food and travel lanes. Woods borders of shrubs recommended to protect trees in the wood lot are important sources of wildlife food and cover. Odd acres on the farm, not suitable for crops or pasture, such as pot holes, rock piles, or swales can be fenced or planted and improved for wildlife. Small marshes may be improved to produce muskrats—a cash crop for the farm family—and at the same time furnish breeding and resting sites for waterfowl as well as other species of game. All these things are important, but many of them are not practiced by the average farmer.

To lessen the lag between planning for the soil conservation measures mentioned and their application, the State Conservation Department through its Division of Fish and Game has launched an assistance program with soil conservation districts. Funds for the work are derived from a Federal Excise Tax on sporting arms and ammunition and made available under the Pittman-Robertson Act passed by Congress in 1937.

Working through its eight district game managers the Pittman-Robertson project uses funds for labor and material to assist in furthering the application of nine practices recognized by the Soil Conservation Service and the New York Conservation Department as important for soil conservation purposes and of known benefit to wildlife. The practices include:

1. Woodland and wildlife area protection.
2. Wildlife area improvement.
3. Wildlife borders.
4. Farm ponds.
5. Tree planting.
6. Windbreak planting.
7. Hedges.

NOTE.—The author is supervisor, wildlife restoration, New York Conservation Department, Syracuse, N. Y.

8. Marsh management.

9. Stream-bank and shore-erosion control.

In setting up the project with the more than 30 soil conservation districts of the State, a memorandum of understanding was prepared and signed defining the duties and responsibilities of each party. The degree of assistance in any one year was left flexible and will be determined as response to the program warrants. For 1949 the cost to the farmer for tree and shrub planting was \$7.50 per thousand. Conifer stock is furnished free of charge by the Conservation Department to qualified owners who are cooperating with the department's forest-management program. Shrubs are a free contribution from the Division of Fish and Game and the Pittman-Robertson fund.

Not all owners want their trees and shrubs planted. Some desire supervision only. This is provided or help is obtained from youth groups and sportsmen's clubs to assist with the planting work.

To get woodlands fenced against grazing there are several choices. A crew will do the job for the owner if he furnishes suitable posts and wire and pays 25 cents per rod toward labor costs. Or, as is often the case, the farmer may desire to build his own fences. He may receive either posts or wire for the purpose. With marsh development for muskrat and waterfowl production, owners with suitable sites are encouraged to a considerable degree. The Soil Conservation Service technicians prepare necessary engineering plans for dike construction. The Pittman-Robertson project will contribute one-half the cost of construction (if the job is small) but not to exceed \$10 per marsh acre or a total of \$100 per marsh unit. Shrub plantings of various kinds (hedges, woods borders, or wildlife areas) are usually made at the same rate applying with evergreen trees—\$7.50 per thousand.

As now established and after one season of operation the plan seems to have much merit as a means of spurring the application of several worth while conservation measures on the farm. A total of 5,483,780 trees and shrubs were either planted, supervised, or furnished to soil conservation district cooperators this past spring. Nearly a thousand farms were involved. An estimated total of more than 30,000 rods of fence has been built directly or by landowners, using mate-

rials provided by the project. Several hundred acres will be developed into valuable muskrat marshes during the course of the year. All these things, taken together, mean a definite step in the direction of sound, worth while, private-land game management. True, it will take years before the cumulative effect is felt in increased game populations. In fact, there will always be ups and downs among the various species as unfavorable factors take effect. But the basic requirements are being met. The effects of intensive agriculture and the destruction of wildlife habitat are being checked. This seems the only sound way to encourage a farm crop that, unlike others, is enjoyed and harvested by a cross section of all the people—farmers and city people alike. And it is a splendid example of inter-agency cooperation to get a job done. What could be more appropriate than to have a sportsmen's fund directed to help farmers maintain and improve this mutually desirable resource and thus continue the sport of hunting in the American tradition?

POLICING THE TOPSOIL.—It is now possible for Massachusetts cities and towns to prohibit or regulate the removal of topsoil. The General Laws have been amended by adding this paragraph:

“(17) For prohibiting or regulating the removal of soil, loam, sand, or gravel from land not in public use in the whole or in specified districts of the town.”

The amendment, now in effect, makes it possible for cities and towns to protect their land from wholesale exploitation. Wholesale removal, explains A. B. Beaumont, State conservationist, has become an acute problem in some towns, particularly in the eastern part of the State where large quantities of loam are used for landscaping purposes.

On the campus at the University of Massachusetts, official action announced in the Executive Bulletin says:

“The construction program on the campus sometimes creates surplus quantities of topsoil. This is a valuable property and its use needs to be assured for the best interest of the university.”

ONE THING LEADS TO ANOTHER.—Sound farm wood-lot practices, introduced by SCS in southern Jersey's Camburton, Southeast Jersey, and South Jersey Soil Conservation Districts, have been important factors in advancing good land use and in obtaining farmer acceptance of complete conservation farm plans.

“Complete farm plans in Salem County were made on many old farms only after the owners had completed successful timber sales at a good price,” says Glenn E. Smith, SCS forestry specialist, after 5 years' work in the field. “Their owners have brought in other farmers.”

LESS STREAM-BANK EROSION—MORE PHEASANTS AND QUAIL

By A. J. WEBBER



Stream-bank erosion was a problem on the farm of E. R. Frei, 2 miles southeast of Santa Clara. Black willow post cuttings were planted in the stream bed and along the embankment behind cabled cottonwood trees.

CONTROLLING stream-bank erosion and increasing feed and cover for wildlife through the use of dual-purpose tree and shrub plantings is becoming a recognized practice in soil conservation districts in southern Utah.

Stream-bank protection in soil conservation districts in Washington County, Utah, was first undertaken in 1939. Since then approximately 45,000 linear feet of tree and cable revetments have been installed in a structural control for protection of valuable irrigated farm lands. However, this type of installation provides only a par-

tial solution to bank protection problems and must be accompanied by the planting of willows and shrubs in the silted area behind the revetment in order to make a permanent living protection.

In addition to the use of tree and cable revetments, various types of log and rail tetrahedrons, jetties, willow mats, and other materials have been used as mechanical means of slowing down flood water and causing the silt-laden streams to build up a bar behind the revetment.

These silt bars which vary in width from a few feet to several hundred feet, depending on conditions, must be planted to some type of vegetation which will stabilize the bar and protect it

NOTE.—The author is district conservationist, Soil Conservation Service, St. George, Utah.

from further cutting action. Trees and shrubs having a dense mat of roots are usually most suitable.

The primary purpose of all channel-stabilization plantings is to provide permanent, low-cost erosion control. Our experience is that mechanical controls and vegetative plantings must be used together to be effective.

Stream-bank plantings should not only prevent erosion from cutting banks, but also should include sufficient plantings from the edge of the stream bank to high ground to slow flood flows and prevent the formation of new channels behind the mechanical protection.

Stream-bank plantings along the Virgin River and Santa Clara, LaVerkin, and North Creeks in Washington County, Utah, have consisted largely of Russian-olive, rose, black-locust, squawbush, and black-willow cuttings. These dual-purpose species protect actively eroding stream banks and provide cover and feed for wildlife in one operation.

These plantings provide excellent habitats for

game birds, such as pheasants and quail. Ideal sites were established on silt fans in stream beds, ox bows, waste areas between crop boundaries and streams, and other suitable areas.

Every pheasant and quail hunter knows enough to look for birds along field boundaries and stream channels grown up with trees and shrubs. Many farmers, however, believe that these areas also harbor harmful insects and are a source of weed-seed infection and, as a result, prefer "clean" farming. The type of protection and feed along stream banks that is desirable, from a wildlife and erosion-control standpoint, however, is not an unattended growth of volunteer vegetation, but a well-planned and managed stand of species.

A typical example can be found on the farm of George Graff, 8 miles southeast of Santa Clara. Plantings were made along the Santa Clara Creek in cooperation with the Lower Virgin-Santa Clara Soil Conservation District.

The plantings were made in 1940 in connection with the installation of tree-and-cable stream-bank revetment works along an active cutting bank



Here's how the erosion was checked by growing trees.

and on a huge ox bow in a bend in the stream.

The plantings have been protected from grazing by livestock and are doing a very good job of guarding valuable irrigated lands from further damage by flood flows. They also furnish food and cover for pheasants, quail, and other wildlife.

In stream-bank protection work, wildlife man-

agement and erosion control are complementary activities.

If plans include adequate provision for a better wildlife environment, substantial returns may be expected. To neglect the intelligent use of border lands is to overlook a great opportunity for encouraging the presence on the farm of valuable birds and animals.

SAND LOVEGRASS MAKES A COME-BACK

By M. D. ATKINS and A. J. LONGLEY

SAND LOVEGRASS, *Eragrostis trichodes*, a native of the sandy lands in much of the Great Plains, where it became almost extinct 10 years ago, is making a remarkable come-back in Kansas. This is important from both the conservation and the grazing standpoints, since sand lovegrass is about the best plant we know for erosion control on hundreds of thousands of acres of sand-hill lands in Kansas and Nebraska that are low in fertility and now produce little forage of value for grazing. It is also an example of how soil conservation districts, farmers, and SCS personnel work together to do in a relatively few years something that would take Nature generations to accomplish, if ever.

The near extinction of sand lovegrass in this area resulted from a combination of factors. A tall-growing, perennial bunchgrass, it was an important part of the native composition on these sand-hill range lands that included sandhill bluestem, little bluestem, side-oats grama, blue grama, and several lesser species. But its soft leafy growth was relished by livestock above all others. As grazing on these lands became heavier, due to a rise in livestock numbers and plowing of other grassland, sand lovegrass was utilized most severely. Then came a history-making drought and the plant disappeared from many sand-hill pastures in the State.

Other desirable species were reduced in the most severely damaged pastures, but none became so nearly extinct as sand lovegrass. Sagebrush, sand paspalum, sand dropseed, and weedy forbs and grasses are the principal vegetation in much of



This field—15 acres of loose, sandy soil that was low in fertility—yielded a sand lovegrass seed crop the first year. It is on the Harry Lightner farm near Garden City, Kans.

the Kansas sand-hill land. A few ranches in southwest Kansas, where cattle numbers were reduced in time, and a considerably larger area in south central Kansas still support fair stands of gramas, bluestems, and switch grass. But to find the tasty sand lovegrass in this area, it is usually necessary to examine the roadsides outside the pasture fence or pastures that have had little or no grazing the last few years.

Sand lovegrass started its come-back when a few pounds of seed were obtained by the Soil Conservation Service from collections in Oklahoma. This seed was planted in 1939 on a trial basis with other native warm-season grasses on the Morton County Land Utilization Project at Elkhart, Kans., where more than 70,000 acres of federally owned land needed reseeding. More than 40,000 acres of this is loose sand or sand-hill land bordering the Cimarron River. Sand lovegrass and

NOTE.—The authors are observational nurseryman, Soil Conservation Service, Manhattan, Kans., and district conservationist, Soil Conservation Service, Garden City, Kans.

sandhill bluestem proved to be two of the best species for these loose sandy lands, but seed supplies of neither were available commercially.

So development of a seed supply was the first job. Five acres of sand lovegrass were planted in rows at Elkhart in 1942. This planting was so successful that 160 acres were planted in 36-inch rows the following year. This field, with one cultivation a year, has produced a seed crop each of the last 5 years and has provided enough seed for planting several thousand acres of these federally owned sandy lands each year. Seed-production fields totaling about 15 acres were established at the same time at the SCS nursery at Manhattan. The seed produced by these plots, plus some seed harvested from scattered pasture areas outside the nursery, was distributed to soil conservation districts. Practical methods of planting, growing, and harvesting sand lovegrass were also developed by the nursery and the information furnished to soil conservation technicians assisting districts.

The technicians, in turn, took this information to farmers and ranchers cooperating with districts and helped the interested ones to develop seed-production fields and harvest seed. Leadership in districts to bring sand lovegrass seed into production undoubtedly goes to Hugh Richwine, district conservationist at Dodge City, Kans. He was tireless in his efforts to get farmers started on seed production and seeding of the sandy lands. Others who deserve special credit include George S. Atwood, work unit conservationist for the Morton County LU project; Tom D. Dicken, district conservationist at Pratt; and Clyde B. Dennis, work unit conservationist at Larned.

Farmers took slowly to the new crop at first, but many ranchers went to see the grass seeding on the LU area and on the grazing studies at the United States Southern Great Plains Field Station at Woodward, Okla.

As interest heightened, district boards and technicians urged farmers to plant 2- or 3-acre



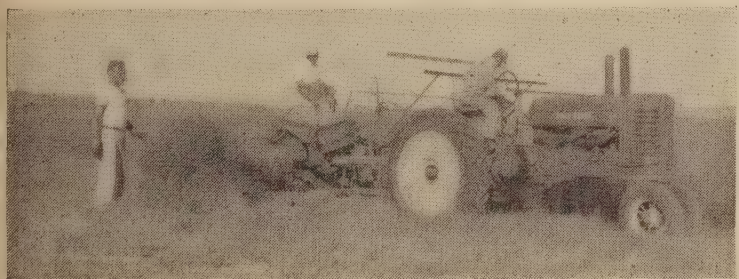
This stand of sand lovegrass on the J. E. Buster farm near Larned, Kans., was planted in 30-inch rows for seed production in February 1947. Seed was harvested in 1948.

plots of sand lovegrass in rows for seed production. This did not succeed because the fields were so small that it took a farmer longer to get ready to plant, cultivate, or harvest than it did to do the job. Very little seed was harvested. By 1945 it was realized farmers must be helped to produce sand lovegrass on a field basis if the necessary seed were to be produced.

In 1945 and 1946, with seed costing \$2.50 a pound, several farmers planted fields ranging in size from 5 to 50 acres. Most of these plantings were on light, hazardous, beaten-up, cropped-out, loamy sand. In 1947, with the market price of \$3 per pound for the seed, many more sizable fields were planted in rows for seed production. This was on better land, some of it irrigated. In 1948 farmers paid as high as \$5 per pound for seed for additional field plantings. In 1949 their efforts really began to pay off. Although there is no complete record of seed produced, reports from 16 soil-conservation districts in south central and southwest Kansas show a total of 51,926 pounds of sand lovegrass seed produced in 1948. In the Edwards County Soil Conservation District alone, 7,900 pounds were harvested.

Yields of sand lovegrass seed have varied considerably, depending on type of land. Harry Lightner, Garden City, cooperating with the Finney County Soil Conservation District, planted 25 pounds of seed on 15 acres of loose, nearly infertile sand in 1947. He controlled the weeds by mowing until mid-summer, and that fall he collected 368 pounds of seed even though a seed crop is usually not expected the first season. He used 2,4D to control weeds the second season and harvested 2,200 pounds of seed on this same field.

In contrast, Myles McGeehee, Pierceville, cooperating with the Gray County Soil Conservation District, planted sand lovegrass in 24-inch rows on bottom land with a beet drill, mixing the seed



Harvesting sand lovegrass with binder on the C. O. Fisher farm near Fellsburg, Kans.

with milo chop in order to reduce the rate of seedling. He irrigated the field once the first year and mowed once to control weeds. The second year he killed the weeds with 2,4D and irrigated the crops once. He harvested the seed with a binder and threshed with a combine, bucking the shocks to the combine. The seed yield was 3,000 pounds from 10 acres.

J. E. Buster, Larned, a cooperator with the Pawnee County Soil Conservation District, planted 33 acres of sand lovegrass with a lister in 42-inch rows in February 1947, listing it shallow in volunteer rye. The covering disks were reversed and set down. This made a small furrow on each side of the bottom of the lister furrow, to prevent sand from washing it and covering up the seedlings. Actually, the seed was planted on a ridge in the bottom of the lister furrow. Buster mowed the rye the first year and in the second year gave the grass one cultivation. He swathed part of the crop and threshed it out of the window with a small combine and pick-up attachment. He harvested the rest of the crop with a grain binder and threshed from the shock. This field, along with a 33-acre field planted the previous year, produced a total of 5,800 pounds of seed.

Cooperating with the Finney County Soil Conservation District, L. L. Jones, and son, purebred Hereford breeders with 10,000 acres of sage-covered sand-hill pasture southwest of Garden City, planted 15 acres of their best irrigated land in the Arkansas River bottom to sand lovegrass. They were interested in producing seed to improve their own depleted pastures. They combined 2,000 pounds of clean seed from their field in 1948 to give them a good start on their reseeding program. They also bought a grass drill.

Wendell McMinimy, Ashland, a Clark County Soil Conservation District cooperator, planted sand lovegrass in 42-inch rows, mowed the weeds the first year and sprayed for control the second year. He said that if someone had offered him \$5 an acre on his investment, he would have been tempted to sell out. But in the fall of 1948, he combine-harvested 570 pounds of sand lovegrass seed an acre from this 10-acre field for a total yield of 5,700 pounds. The soil is not very sandy, but is upland, receiving no moisture other than rain and snow which fell upon the field.

Nathan Hayse, Jr., Mullenville, cooperating with the Kiowa County Soil Conservation District, used the same system as McMinimy on 50 acres,

except that in May he applied 100 pounds of ammonium nitrate per acre on most of the acreage. The nitrate made the difference between no seed and 100 pounds per acre, which is good yield on very thin sandy land.

Harry Brown, Holcomb, a Finney County Soil Conservation District cooperator, harvested 2,000 pounds of seed from a 120-acre pasture seeding made in 1947. He hadn't intended to harvest seed from that area, but spring growth in 1948 was so good that he withheld grazing, with the result that he now has a supply of seed for additional pasture seeding.

It appears the sand lovegrass seed production problem has been solved. Many farmers now know how to produce it. Although 2 to 4 pounds of seed per acre were used in some of the earlier seedings, it has been found that not more than 1 pound of good seed per acre is needed to give adequate stands in 36-inch rows.

Seed dormancy, which caused considerable late-season emergence in some of the first seedings and caused some seed lying over until the second year before germinating, has been overcome, at least in part, by planting in very early spring—as early as February 15. The theory behind early plantings is that the seed will be subjected to conditions equivalent to the soaking and prechilling which increases germination of the seed in the laboratory. Technicians have reported better stands from these early plantings than from those of mid-April or later. Since many of these fields are on infertile sands, several farmers plan to try fertilizer to increase seed yields. The application of 60 pounds of nitrogen per acre on April 15 to May 1 at the SCS nursery at Manhattan increased sand lovegrass yields from 279 to 388 pounds per acre in 1944, from 116 to 198 pounds in 1945, and from 104 to 261 pounds in 1948.

In addition to these row plantings which are providing the needed seed, ranchers and farmers are planting more and more sand lovegrass for pasture, 200 acres here, 75 acres there, several thousand acres seeded by plane. Still more seed-increase fields are being planted by farmers, who no longer need to be urged.

Regrassing this area in southwestern and south central Kansas is a tremendous task. Much of it is rolling, loose sand hills, with many pastures of a thousand acres and up that are virtually inaccessible to machinery and largely covered with sagebrush. Special grass drills and broadcast-

type seeders have been used on the Morton County LU lands, but getting over sagebrush land with this type of equipment is so difficult that the sandy lands that once were cropped have been seeded first. Most of the sagebrush land remains to be seeded. Various ways to remove or reduce the sagebrush, before seeding with a drill, have been tried. Mowing, railing, 2,4D spraying and use of a one-way plow have met some success, but ranchers generally are skeptical of this type of treatment.

Most ranchers hope airplane seeding will prove practical. The first to seed sand lovegrass by plane was Chet Reeve, cooperating with the Finney County Soil Conservation District in the seeding of 800 acres on his ranch south of Garden City in April 1947. Moisture conditions were good and he obtained good emergence, but there was a heavy grasshopper infection that year and by mid-summer only a few plants could be found. They were around blow-out areas, where grasshopper populations were light. With the plentiful 1948 crop bringing the seed price down to \$1 to \$1.50 a pound, and with some ranchers even raising their own seed, interest in airplane seeding is growing again. Airplane seeding was tried in February 1949 by John Burnside, 640 acres; Chet Reeve, 1,200 acres; and O. C. Hicks, 1,280 acres in strips. In the Clark County Soil Conservation District, J. E. Alexander, Ashland, seeded 2,000 acres of his ranch by plane.

It may be that some method of ground planting, and perhaps some other grass species may have to be included to improve these depleted sandy range lands but, anyhow, enough seed is available for immediate demands of a grass that promises to have a very important place in regrassing this area. And the production of sand lovegrass seed has paid off in profits to the growers, in lower cost seed for farmers and ranchers to use in making sandy land into good pasture, and in eliminating potential wind-erosion hazards by getting this land into its best use, which is growing grass for livestock.

The production of sandlove and other grasses for seed has paid off in other ways, too. Farmers and ranchers are getting grass conscious. They are learning more about grasses since grass seed production aroused their interest. They are interested in having better grasses—Blackwell switchgrass, Caucasian bluestem, intermediate

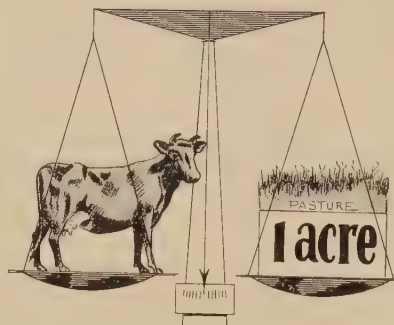
wheat, sand love, and others. Last spring no farmer with 100 acres or more to plant to grass suggested dilly-dallying along with planting 10 to 15 acres a year—he wanted to do it all at one time. Farmers who have land that should be in grass for pasture rarely ask today how they might keep farming it to skin-out a few more crops. The question is usually, "What kind of grass should I plant and how is the best way to do it?" Sand lovegrass seems to provide the answer for the sand-hill areas not only in southwestern and south central Kansas, but probably in adjoining States as well.

COST CAN BE COUNTED

(Continued from page 122)

ments to their own farms could figure out the costs. Each field and its improvements were described and the cost estimated and it was figured out just what the field would have to produce to pay the improvement cost.

The farm on which the demonstration was made covers about 135 acres. Designed to support, eventually, a herd of 30 dairy cows, a first objective is to put the land in shape to produce the feed for such a herd. Where four, five, and six acres of pasture now are needed to support one cow, the pasture land on this farm 3 years from now should be capable of supporting one cow for each acre.



PEOPLE WORKING TOGETHER

(Continued from page 131)

realize that the way to move to a better farm is to improve the farm you are on." I noticed that Tenant Myers nodded in agreement at this statement, and so did I.

As well as I could get it, income had increased as the result of the arrangement for operating the farm on a landlord-tenant copartnership basis, and with a thorough-going soil conservation program.

Mr. Cox's last observation was that when the landlord and tenant go into a partnership of this kind it will work if they are both fair, and fail if they are not.

NOTES FROM THE DISTRICTS

WATER, WATER EVERYWHERE.—Farm ponds—big ones, little ones, and hastily scooped dugouts, planned and constructed under SCS technicians' guidance, paid crop-saving irrigation dividends to many northeast farmers during last summer's drought.

In the Hampden (Mass.) Soil Conservation District, one vegetable grower overcame the emergency by pumping from his farm pond the equivalent of 1½ inches of rainfall on his fields every fifth day.

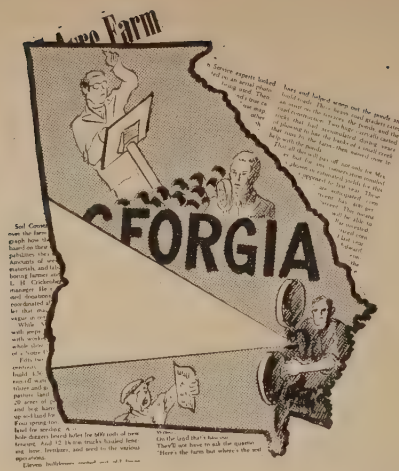
In the Allegany County (N. Y.) Soil Conservation District, Leland Kreidler, potato farmer near Canaseraga, with the help of SCS technicians dug a small experimental pond at a cost of about \$400. To it Kreidler hooked a pump and enough 10-foot sections of aluminum pipe to stretch across his widest field. Nozzles at every 30 feet threw water 20 to 50 feet. Twenty rows were covered at one time. Results were so satisfactory that he brought the SCS and district men back to double the capacity of the spring-fed dugout at a cost of another \$400, because he needed still more water.

Solitario Brothers, Freeding Hill market gardeners in the Hampden (Mass.) Soil Conservation District, built a 100,000-gallon pond (occupying one-tenth of the surface area) in an old swamp site. Holding enough water to irrigate 4 acres every eighth day, it proved its worth during the drought.

In the Plymouth (Mass.) Soil Conservation District, Joseph Teeling, Middleboro farmer, put a new farm pond to unexpected use when drought closed in on his small fruits. He bought irrigating equipment, hooked it to the pond and pump, and saved his fruit.

The drought has given farm-pond construction its biggest impetus. In New York, another powerful influence has been the farm-pond building program launched by the State grange. This organization puts emphasis on stock and spray water, irrigation and fire-protection services, with fishing, swimming, boating, skating, and picnic centers in minor roles. In the Allegany County (N. Y.) Soil Conservation District in June 1949, a farm pond was built every day—30 completed during the month.

EQUIPMENT AT HAND.—Kenneth and Douglas Bray, GI brothers who are farmers in Flemington County, N. J., in the Mid-Jersey Soil Conservation District, are demonstrating how farmers can install major parts of their conservation farm plan with their own equipment. When normal farm operations are slack, they build diversions and terraces as rapidly as SCS technicians can establish the lines. When farm operations pick up and the Brays are needed for regular field work, they hire a contractor to finish the jobs they have started. Of their 147 tillable acres, 102 are now contoured. Since 1948 they have built 5,000 linear feet of diversions, planted 35 more acres on contour, and removed 4,000 linear feet of hedgerow that permitted them to reclaim 2 acres of good land. About half the work has been done with their own equipment. Brayacres no longer looks like the erosion-scarred farm they bought 3 years ago.



WEEK WENT WELL.—Georgia's Second Annual Soil Conservation Week last fall found more than 20,000 persons attending conservation demonstrations, meetings, and civic club programs. Almost 40,000 Georgians heard ministers deliver 385 sermons appropriate to the occasion.

The State's 25 soil conservation districts report that approximately 200 motion pictures dealing with conservation subjects were shown to 14,000 people. In on-the-farm training classes more than 10,000 veterans heard lectures on soil conservation activities.

The week received attention in 735 newspaper articles, 112 newspaper editorials, 513 newspaper advertisements, 96 radio programs, 138 farm tours, 51 exhibits, and the distribution of 5,600 placards, stickers, and bulletins.

EIGHT ACRES BROUGHT TO LIFE.—Hedrick Brothers, Holly Valley farmers in Tygart's Valley District, Tucker County, W. Va., with SCS help have converted 8 acres of abandoned land to lush pasture. Where there were only white oak sprouts and weeds, not enough vegetation to support one animal unit, 12 head of dairy cattle now feed on luscious grass.

After the 8 acres had been cleared in 1947, 24 tons of ground limestone and 2 tons of 0-20-0 fertilizer were worked into the soil by disking and harrowing before the field was seeded with a bushel of oats per acre and a mixture of redtop, orchard grass, alsike, and Ladino. When the oats were 15 inches tall, 7 dairy animals were turned in for 3 months' grazing, because there was no other pasture on the farm. In August the pasture was clipped for weed control.

In 1948 the seven dairy animals grazed there from early spring until late fall. The pasture had no additional treatment except for another August clipping. In 1949, 12 head of dairy animals grazed there. After clipping in August, 500 pounds of 3-12-6 and 200 pounds of 0-20-0 per acre were applied.

An additional half acre is getting a similar treatment and two more fields are to be handled in a comparable way.

THE FENCE IS ALIVE.—In Massachusetts, more than 80,000 multiflora rose seedlings, supplied by the United States Soil Conservation Service and the Massachusetts Department of Conservation, have been planted this year—15 miles of living fence in the making.

RHODE ISLAND PONDS.—For protection against future droughts, such as they suffered last summer, four Newport County cooperators in the Eastern Rhode Island Soil Conservation District are spending \$50,000 to build farm ponds and install irrigation systems, under the guidance of SCS technicians.

Because it requires 27,000 gallons of water to cover an acre of land with water 1 inch deep, the technicians made the first important contribution in the farmers' conservation program by determining that a sufficient supply of water is available to justify the expenditure and effort.

A brook-fed pond at Tobias Cotta's Middle Road farm will hold 1,400,000 gallons of water and irrigate 26 acres of potatoes. The irrigating system will require 3,000 feet of drains and 1,000 feet of laterals.

At Gabriel Rego's Mitchell Lane farm, underground springs will supply the water to irrigate 50 acres of potatoes, corn, and other crops and provide water for his farm stock. The excavation will cost \$1,000.

Ralph Turner is building a 1-million-gallon pond at his East Main Road farm where he will irrigate potatoes, his principal crop.

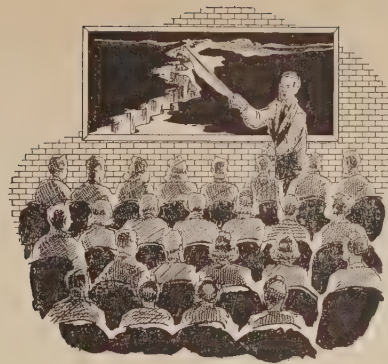
Two ponds, holding 3 million gallons, are being built at Herbert Chase's Bristol Ferry Road farm. A brook is being diverted to supply some of the water. The remainder will come from surface runoff and springs.

All of these farmers have terraces and contoured plantings, designed to hold water on their land, as part of their conservation farm plans.

POND FOR FLYING FARMERS.—When John Canne, co-operator in the Ontario County Soil Conservation District, near Phelps, N. Y., built a farm pond as part of his complete conservation farm plan, he prepared for fire protection and livestock and irrigation water and stocked it with fish. Then, remembering that he is a Flying Farmer, he had the SCS technicians design the dyke so it would be wide enough to serve as a landing strip. Next he equipped his hangar with dressing rooms, so his family and neighbors could use the pond for swimming. In August, fellow members of the New York Flying Farmers club and their families, 50 persons in all, came flying in, landed on the strip and held a Sunday outing, including a picnic dinner and a club meeting, around the pond.

DETOUR.—While scooting down New York State Highway 17, vacation bound from Iowa to New York City, G. Washington Smith misinterpreted the signals of a State policeman who was guiding traffic to a soil and water conservation field day at Apalachin, near Owego, N. Y., and entered one of the narrow dust-heavy country roads leading to the operations. He thought it must be a detour.

A mile or so up the hill, he discovered his error. Like some 40,000 other people, he landed in a parking lot where everyone was arriving and no one was leaving. Several hours later, when the rush eased, Smith and family maneuvered their car out of the lot, back down the hill, and again headed for "Big Town." Commented Smith, "We're powerfully strong for soil conservation out in Iowa, but this beats anything I've ever seen."



EVERY PUPIL REACHED.—Soil conservation has been included in *every* course of study in *all* the grades of the 25 schools of the Waco, Tex., public school system this year.

Irby C. Carruth, superintendent of the Waco schools, with conservation material furnished by T. O. Pridgeon, district conservationist, has prepared a teaching guide for all the grades in his school. This guide makes it possible for teachers of all courses to inform students as to the seriousness of erosion and the urgent need for a coordinated conservation program. For example, the mathematics courses have problems pertaining to erosion and conservation; the art courses depict forcefully the results of erosion and the conservation practices so necessary for a permanent agriculture.

Field trips are arranged to study conservation practices applied on farms of the McLennan County Soil Conservation District cooperators. Students are gaining information about the organization and operations of their local district. The board of supervisors has encouraged Superintendent Carruth to continue his aggressive interest in conservation, and are hopeful that other schools in the district will be inspired to follow the example set by Waco.

OUT WHERE THE DEER ROAM.—Deer hunters in the vicinity of Tooele, Utah, were enlisted in range reseeding work this fall, according to Orville Mooberry, president of the Tooele Wildlife Federation.

Boy Scouts and members of the federation prepared 1,500 bags containing a mixture of five varieties of hardy grass seed. These bags were made available to hunters at hardware and sporting goods stores and at checking stations.

Harry K. Woodward, representing the Soil Conservation Service, furnished seed and detailed instructions for planting. Each bag contained enough seed to plant 40 square feet.

Seed enclosed in the bags included crested wheat, yellow sweetclover, bulbous bluegrass, smooth brome and Indian ricegrass. These will grow with as little moisture as any other grasses, and are good range plants.

The plan is designed to help improve the range, and will help to keep the deer in good shape and assure good hunting in future years.

30 MILES PER HOUR.—Frank Coles, conservation farmer at Deerfield, southern New Jersey, says he can drive his car over any field on his farm at 30 miles per hour without being uncomfortable. A few years back,

before he put his complete conservation farm plan to work, he couldn't cross gullies on 50 percent of his land with a tractor in low gear. Six or eight years ago, when Coles had straight-row crops, his farm was washing away during every rainstorm. Now, with contour cultivation, diversion terraces, and all the other practices that go with conservation farming, he can set up a nozzle on every 20-foot section of irrigation pipe and evenly distribute—and hold—twice the amount of water needed for straight-row farming.

GREEN CARPET FOR INDUSTRY.—Fescue lawns grace 80 acres of a large copper plant at Decatur, Ala.

Last fall, P. W. Robson, a former SCS employee and now engineer for the local plant, asked advice on erosion control. Of course, he wanted not only to stabilize the soil but also to beautify land not covered by buildings and streets.

It was decided that Suiter's grass (Kentucky 31) would best satisfy the need. It was rather late for fall seeding, but Robson decided to increase the rate of seeding and fertilizing and go ahead with the improvement.

About 800 pounds of 6-8-4 fertilizer and 50 pounds of fescue seed were used on each acre. A thorough seedbed was prepared, and everyone hoped the young fescue would pull through the winter in good shape.

Now, both buildings and grounds present a pleasing appearance to all who pass or work there. And thousands of people of the Northwest Alabama Soil Conservation District will be able to observe the growth habits and soil-holding qualities of the fescue.

DRAINAGE PROBLEM.—Water can be one of man's best friends or one of his worst foes, is the conclusion of Arthur Osland near Mayville, N. Dak., in the Northeast Traill County Soil Conservation District. He now is able to seed the south half of his 640-acre farm at the right time and with confidence that water won't ruin his crop later in the season.

This is because of the drainage system he partly completed in 1946.

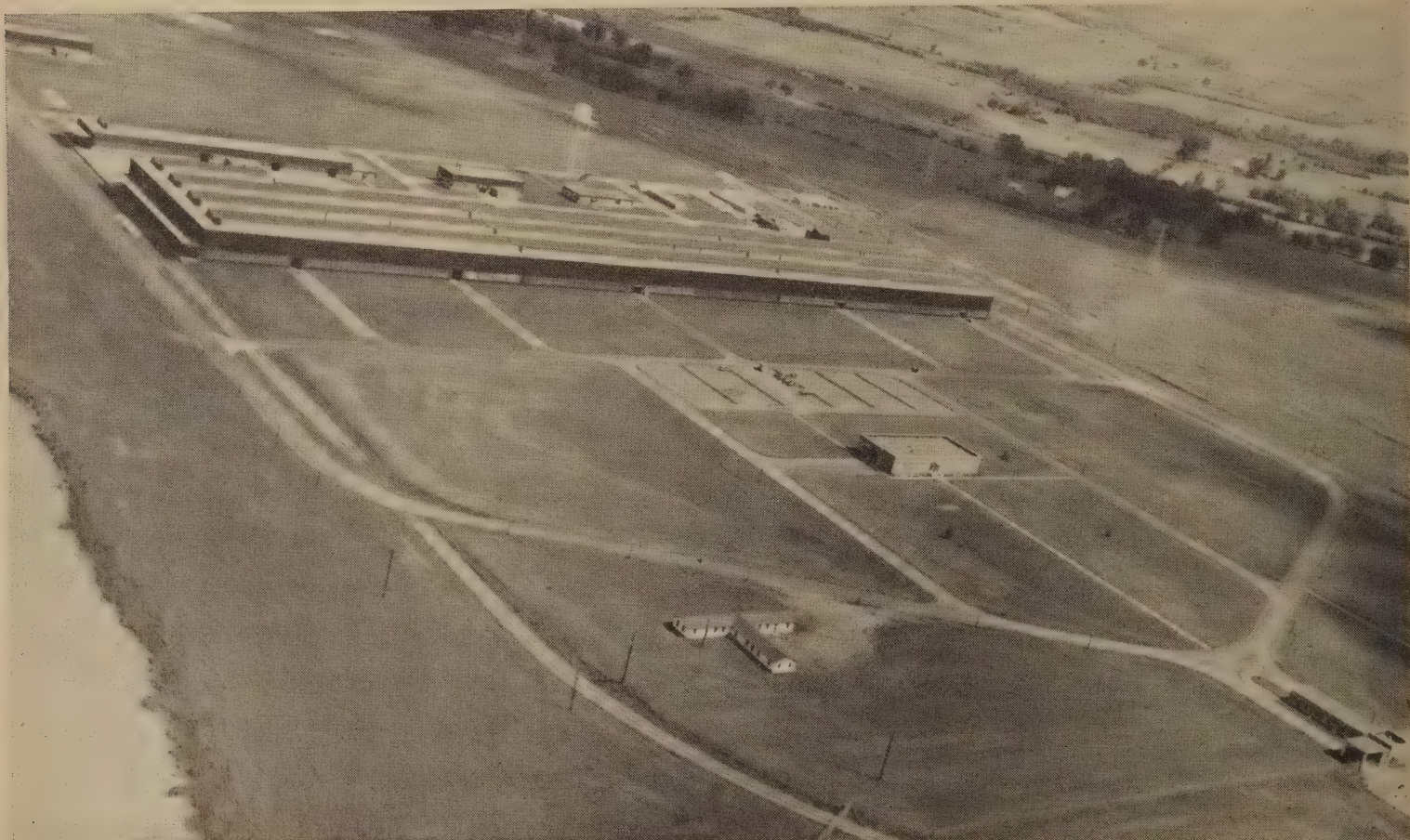
"It's not just spring flooding that causes the trouble," Osland explained. "Nearly every year heavy rains come while crops are growing. Excess water from those rains, standing on the land for a few days too long, is enough to damage the crops and often ruin them."

Osland's farm is in the nearly level Red River Valley, from which snow water leaves slowly in spring and over which runoff from the uplands flows. The south half of the farm is flooded every spring, even during the drier years.

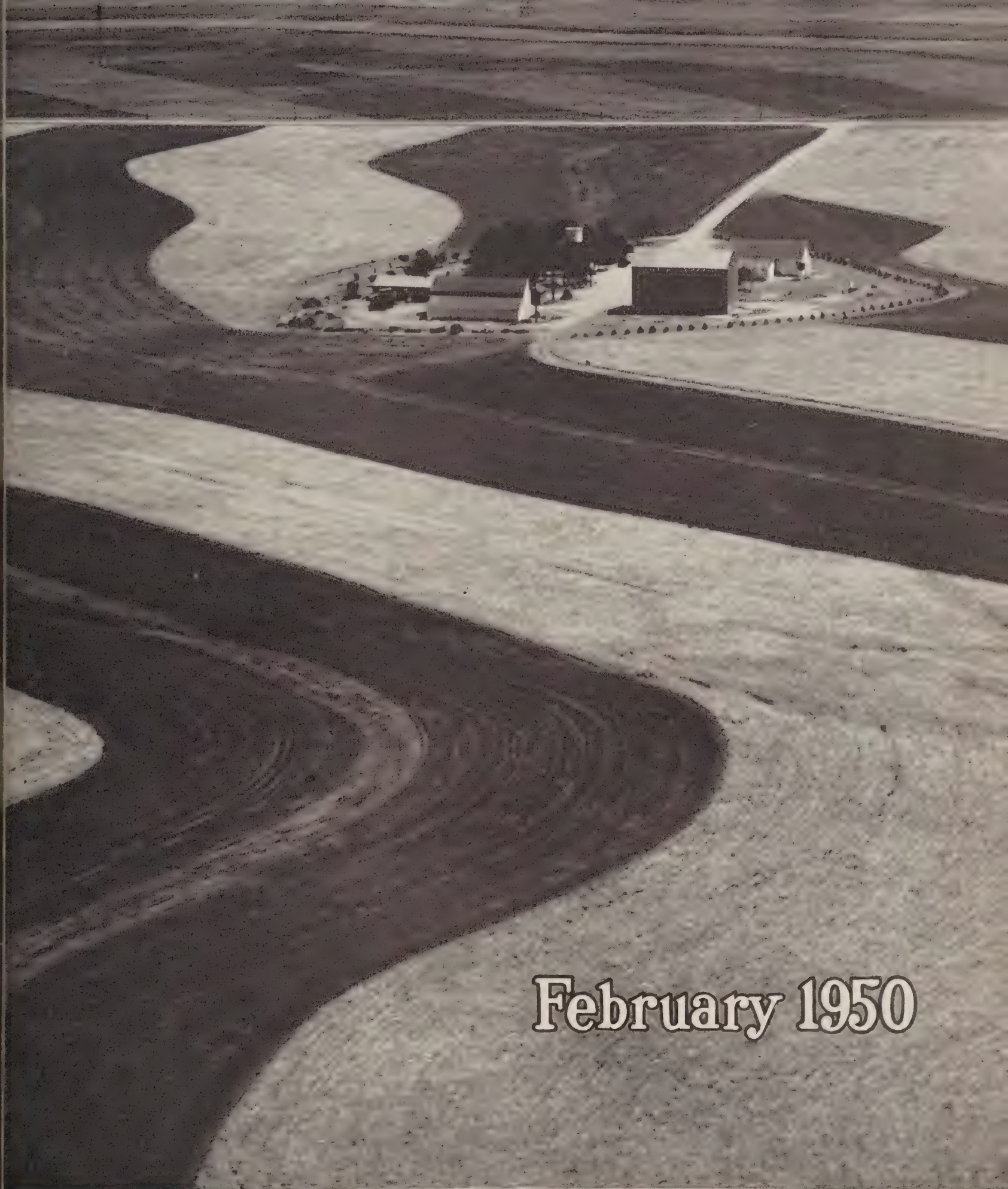
A legal drain passes the farm, but water could not reach it from his land until the farm drainage system was laid out and built.

Soil improvement and a good crop rotation hinge on successful drainage, Osland points out, because a variety of crops cannot be grown unless the land is ready for seeding at the proper time.

"There are very few years that we don't get at least one heavy rain in summer. The excess water from such rains has to be removed before it drowns out the crop. The drainage system has done well both in spring and during the growing season in getting rid of the excess water."



Fescue sod makes an excellent carpet for the buildings of this large copper plant in Alabama.



February 1950

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SOIL CONSERVATION •

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☆ THIS MONTH ☆

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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CUP AWARDED FOR PROGRESS.—

Dukes County (Mass.) Soil Conservation District made district history in the northeast when it offered and awarded a cup as a prize to "the farmer or landowner who, in the opinion of the district, has shown the greatest effort and results in completion of his farm plan." E. Bradford Keith, of Brockton and Chilmark, the initial winner, will hold the cup for a year. It will become the permanent possession of the first farmer who wins it three times.

EXTRY! EXTRY!—The Arizona Association of Soil Conservation Districts has started a printed monthly newspaper, *The Arizona Soil Conservationist*, which is devoted to reporting district activities in the State. The first issue of this five-column, tabloid-size newspaper was published on October 1. The publication is issued from Coolidge, and David F. Brinegar is the editor.

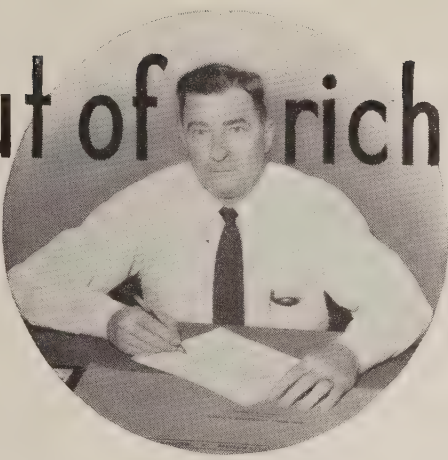


FRONT COVER.—This view is from Los Angeles County, Calif. Over 50,000 acres of strip cropping have been established in Antelope Valley and Portland Ridge. More than 69,500 acres have been planned. These strips are 240 feet in width. The straight rows were made to prevent wind erosion; the curved strips were designed to prevent erosion from both wind and water. The photo is by Dale L. Swartz.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Out of rich soil springs a

STRONG LEADER



Boyce Adams.

By MARY WEBSTER

THE Mississippi delta is more than a section of a State. It's more than 18 counties with some of the richest soil and the most progressive planters in the South. It's also a state of mind. A true deltian is convinced that nowhere else can be grown such fine cotton, such flavorsome pecans, such succulent pasturage.

But the deltian knows also that anything affecting agriculture elsewhere affects delta farming. That's one of the reasons the delta contributes leaders to Mississippi and national agriculture.

Note.—The author is clerk, Soil Conservation Service, Clarksdale, Miss.

A. B. "Boyce" Adams, of Clarksdale, is president of the Mississippi Association of Soil Conservation District Commissioners. He is also Mississippi's council member on the National Association of Soil Conservation Districts, and a member of the association's national legislative committee. And since 1925 he has been a director of the Staple Cotton Association.

Those are some of the responsibilities Boyce Adams shoulders outside the delta. At home, he is a director of the Delta Council and chairman of the council's soil conservation committee. His interests are as diversified as the 3,000-acre plantation he manages for the family. But soil conservation he considers the most important.

Boyce Adams was one of the first deltians to realize that their much-loved soils were ailing. Even delta soil can be eroded, can absorb so much rain that it demands carefully planned and main-



1. One of three churches Adams helped finance for tenants on family plantation. 2. Boyce Adams first planted kudzu on ditch banks in 1934. 3. He learned years ago that rich Delta land needed soil conservation to grow its best crops year after year.

tained drainage systems, and can be overworked in cotton until its essential minerals and organic matter are depleted.

When the Coahoma County Soil Conservation District became the first delta district, Adams was appointed a commissioner by the State Soil Conservation Committee. He now has been chairman several years.

Long before the Coahoma district was organized, Adams was looking for solutions to delta land and water problems. He began serving on the Coahoma County Drainage Commission in 1920.

In 1934, when the now-famous kudzu was used largely as a vine to shade porches in the South, Adams was planting it on canal banks to control erosion and willows. And it worked!

"The advantages of vegetation on canal banks to control erosion was obvious, and we felt that kudzu could be utilized to push out the willows whose roots choked the canal," Adams recalled. "Kudzu has been planted on about 3 miles of ditch bank on our plantation, and has fully proved itself to be an effective preventive for erosion along laterals and canals, as well as a splendid control of undersirable vegetation."

Adams was one of the leaders who obtained a CCC camp in 1940 to rehabilitate delta drainage canals. The camp was located on a part of his land.

When large earth bars were found by the CCC workers in canals on the Adams plantation, the soil was traced to its source—the surrounding fields. And his farm was one of the first in the county to be used for the demonstration by the Soil Conservation Service of a complete soil and water conservation program.

Not until 1946 did Adams finally solve the biggest drainage problem on his land. For years he had attempted to drain a 60- to 70-acre depression with ordinary farm tile. Each time the tile filled with silt, and in several places large sink holes formed. Finally, SCS technicians helped him to put in a combination of open ditches, storm sewer tile, and concrete structures that carried the unwanted water through a high bank into Sunflower River.

"Drainage of this land-locked depression in the center of our farm back in 1946 increased the farm's value more than \$5,000, and paid \$2,400 on a \$3,600 investment in 1 year," the soil conservation leader declared.

Every type of drainage work used in the delta, including some comparatively new measures like row arrangement and W-ditches, is used on the plantation. But the conservation program there includes much more than drainage. There are sericea meadow strips, sericea planted on critical areas, a good crop rotation, black locust for fence posts, and lespedeza bicolor as feed for quail.

That the 100 tenant families are well-satisfied with his management of the plantation is shown by the fact that some have been on the place for 52 years, in Adams' time and his father's before him. Adams has helped with the construction costs of three churches on the plantation, two for Negroes and one for whites.

His father founded the plantation in 1886, going to the delta from South Carolina. In the delta the elder Adams found a section with soil "rich beyond belief" and game so plentiful that tenants ate venison in the winter time like beef. Boyce Adams recalled that his father said he placed 11 deer in the smokehouse in 1 week.

The fine set of antlers over the door in Adams' farm office are his father's trophy, he admits, but the 40-inch fish displayed in a case there was of his own catching. Hunting, fishing, and baseball are among Boyce Adams' interests. At Mississippi College he played baseball, basketball, and football.

Although his father died several years ago, his mother is still living and continues to show a deep interest in the management and expansion of the farm, and in the welfare of the tenants. Her inspiration and encouragement, Adams said, have been of invaluable assistance to him throughout his life.

When Mississippi district commissioners formed a State association, Adams was chosen vice president. He was elected president in January 1948.

Under his leadership the association's active membership and influence have steadily grown, and now all of the State with the exception of only three and a fraction counties has been organized by landowners into soil conservation districts. He feels that all land in Mississippi will be organized into districts within a few years.

Mississippi's fast-growing interest in soil and water conservation is shown also by the fact that the State has the heaviest paid circulation of SOIL CONSERVATION Magazine. Many bankers and

other businessmen, as well as leading farmers, are among the subscribers.

Boyce Adams could easily use all his time with his work on his own plantation and the family land he manages, with the correspondence, speeches, and conferences that the presidency of the Mississippi association requires, with his work in the National Association of Soil Conservation Districts, and his Delta Council activities. But he manages to give many hours and much thought to other interests.

He has spoken on soil conservation before civic clubs and other groups all over the South, often illustrating his talks with slides made on his own land.

He has been president of the Delta National Farm Loan Association, covering Tunica and Coahoma Counties, for 12 years, and has served on the advisory and stockholders committee of the National Farm Loan Association since 1938.

As an active Baptist layman, Boyce Adams serves as a trustee of the Mississippi Baptist Seminary and has been moderator of the Riverside Baptist Association nine times. He is a past president of the Clarksdale Rotary Club, a former post commander of the American Legion, a past worshipful master of the Masonic blue lodge, and is past eminent commander of the Commandery. For 12 years he has been a member of the county school board.

But these many different activities have not lessened his local, State, and national soil conservation work. Every American, he believes, has a vital share of responsibility in maintaining the Nation's soil and water resources in a permanent, productive condition.

Deltans are proud of the way in which Boyce Adams is shouldering his part of that responsibility.

BANKERS SUPPORT SOUND SOILS MANAGEMENT

THE Nebraska Conservation Foundation, Inc., a nonprofit organization, has entered the campaign for erosion control and soil and water con-

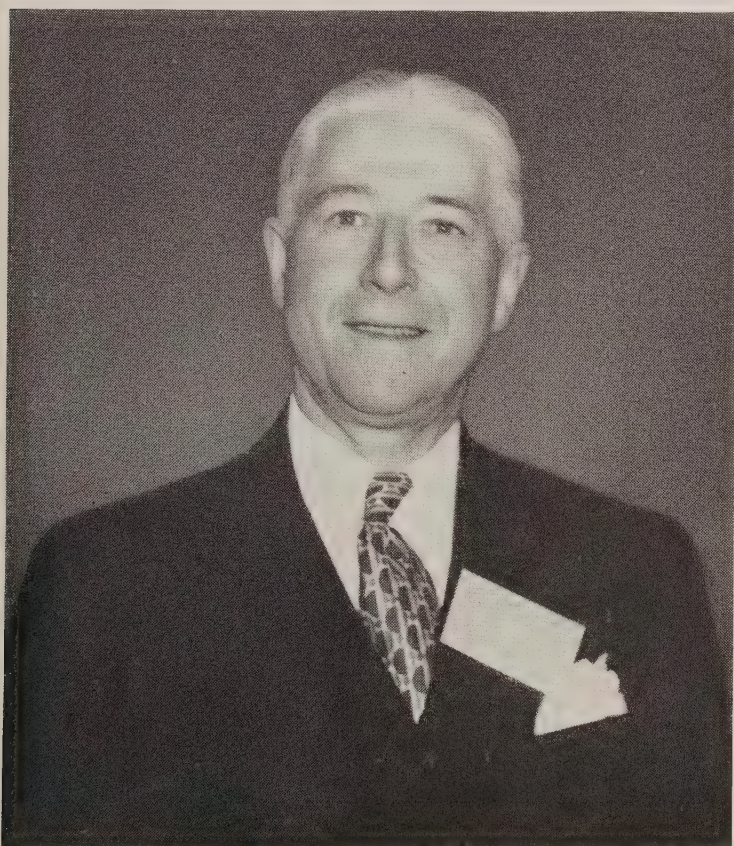
servation. A pioneer in this type of organization, it was fostered by the Nebraska Bankers Association. Its members are bankers and officials of business and industry. Organization was completed during the bankers' convention at Lincoln in October.

J. R. Kenner, of Hebron, president of the Thayer County Bank and retiring president of the association, was elected president of the foundation. First vice president is A. J. Jorgenson, of Sidney, president of the American National Bank; second vice president, W. J. Coad, of Omaha, president of Omar, Inc.; and secretary-treasurer, John F. Davis, of Omaha, vice president of the First National Bank.

Employed as executive director is Fred O'Hair, president of the Central National Bank, of Greencastle, Ind., who has moved to Omaha.

With 91½ percent of all land in Nebraska included in soil conservation districts, and the balance expected to be scheduled for early referendums, all of the officers and nearly all of the bankers of the State are familiar with soil conservation district operation.

In fact, all of the officers have been leaders in advancing conservation in their communities.



Fred O'Hair, executive director.



J. R. Kenner, president.

Kenner and Coad are land operators and cooperators with soil conservation districts. Kenner was one of the early members of the board of supervisors of the Thayer County Soil Conservation District, sixth to be organized in Nebraska.

The foundation had its inception last summer when the executive committee of the Nebraska Bankers Association met with representatives of industry and business at Omaha. At that time, a temporary organization was formed, with equal representation on the board of directors for bankers and industry.

This board is made up of Kenner, Davis, Jorgenson, and Coad; Walter R. Chace, of Pilger, chairman of the board and president of the Farmers National Bank; Rolland Larmon, of McCook, president of the First National Bank; W. H. Munger, of North Platte, executive vice president of the First National Bank; Willard D. Hosford, of Omaha, general manager of John Deere & Co.; John B. Cook, of Scottsbluff, rancher and meat packer; Sam Whiteman, of Hastings, president, Kansas-Nebraska Natural Gas Co.; D. C. Harvey, of Wauneta, rancher and livestock feeder, and R. E. Campbell, of Lincoln, president, Miller & Paine, Inc.

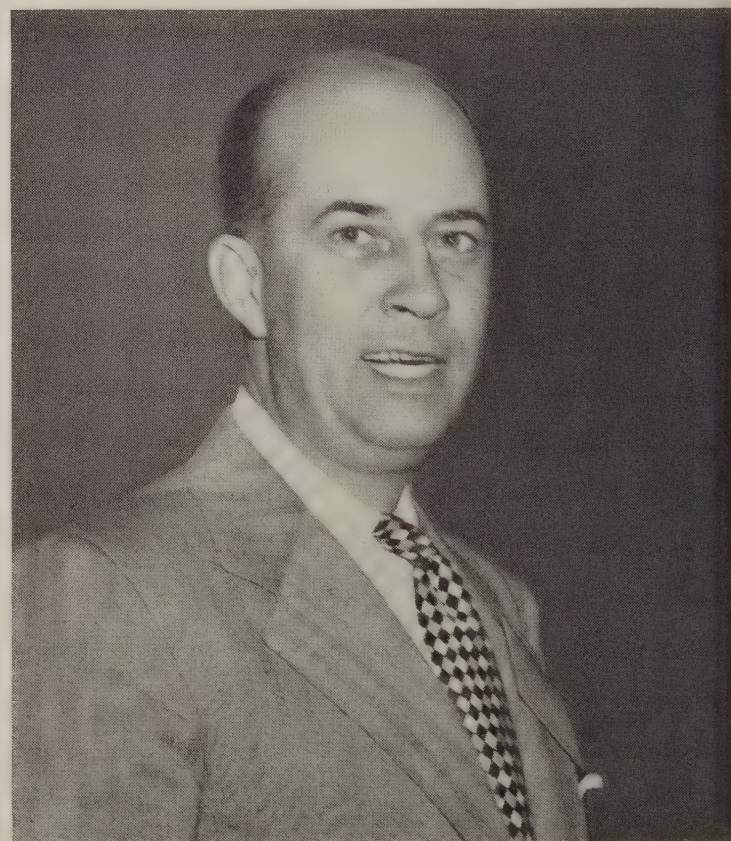
Coad, whose farm near Omaha is regarded by the board of supervisors of the Douglas County

Soil Conservation District as one of the most outstanding examples of a complete soil and water conservation plan, agreed to act as temporary president pending formation of a permanent organization. An ardent conservationist, and friend of Dr. Hugh Bennett, he has spent much time furthering the cause of conservation in the State and played a leading role in launching the foundation idea.

The objectives of the foundation are to foster and maintain a high state of practice in conserving the State's natural resources, to promote through banks and otherwise an enlightened community thought and action concerning conservation needs, to encourage full cooperation by persons interested in conservation with existing conservation agencies—Federal, State, local, and others—and to provide a service for gathering and distributing information about conservation to all interested persons.

The program adopted contemplated a wide range of activity. The foundation committed itself to work for:

1. Good land use planning. This, it is stated, should be carried down to planning correct use, field by field, as recommended by the State soil conservation committee, soil conservation districts, Soil Conservation Service, and State college.



John F. Davis, secretary-treasurer.

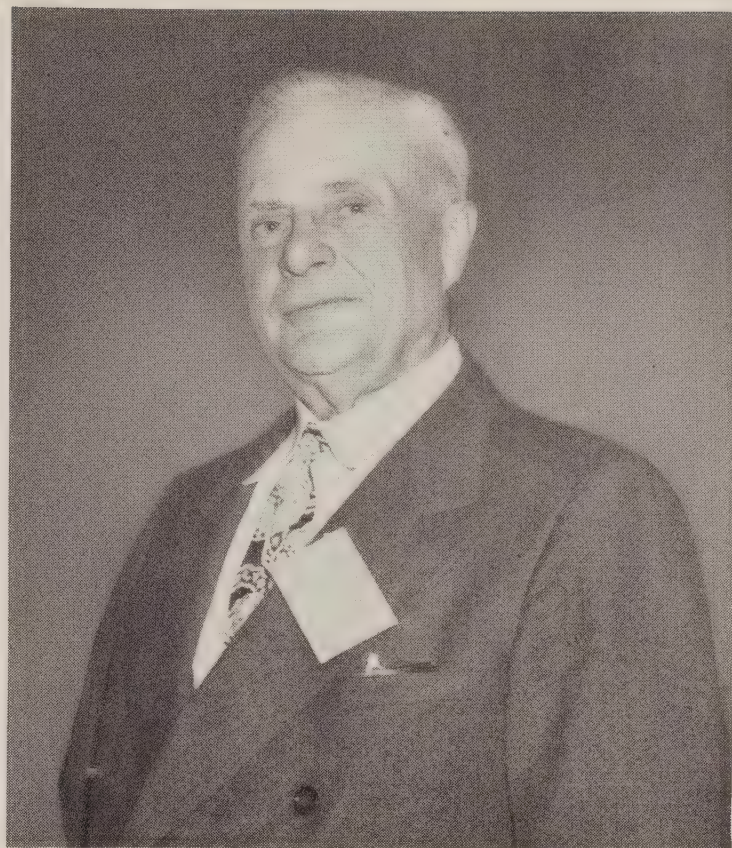
2. Pasture and livestock improvement through renovation; reseeding and fertilizing of existing pastures; seeding the right grasses on cultivated land that should be taken out of cultivated crops; and improved livestock programs, including raising livestock quality, cow-calf enterprises, and pasture feeding.

3. Control of wind and water erosion through the use of adapted measures, including grassed waterways, terraces and contour farming, strip cropping, stubble-mulch tillage, soil conserving crop rotations, gully plantings, and, on irrigated lands, land leveling, correct application of irrigation water, and drainage.

4. Development of good conservation education programs for the schools, including talks and tours.

5. Development of woodland projects—field and farmstead windbreaks to help control wind erosion and protect farmsteads and feed lots, and farm wood lots.

6. Cooperation with manufacturers and others in farm field days and demonstrations.



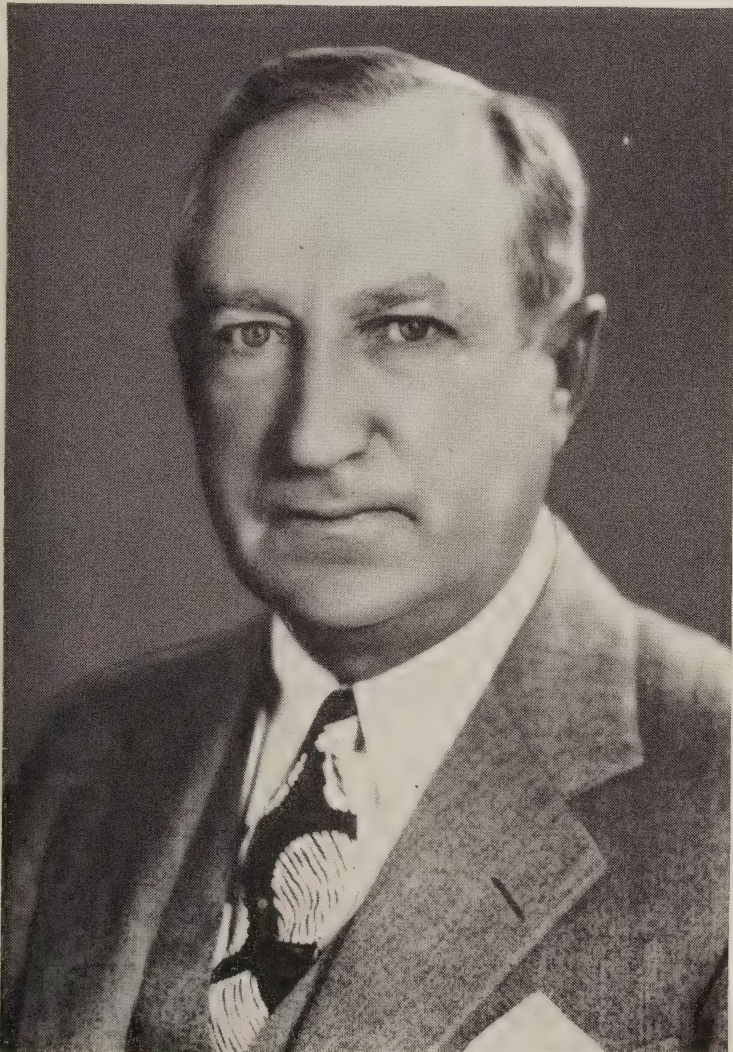
A. J. Jorgenson, first vice president.

In coming to Nebraska to devote full time to the affairs of the foundation, O'Hair has not relinquished his interests as president of the Central National Bank at Greencastle. A graduate of DePauw University, he was connected with the City National Bank at New York City for a number of years.

He brings to the foundation the benefit of 15 years of helping foster conservation in Indiana and of helping advance a sound conservation program in his county. These experiences, he said, have convinced him that a good conservation program in a community is as necessary to bankers, business, and industry as it is to farmers themselves.

"I have been amazed at the improvement in the financial condition of farmers who have put good conservation plans into practice," he said. "Helping the communities attain a high degree of conservation of soil and water is one of the best money-making possibilities available to the average banker today. We must have continuing productivity of the soil in order to have a continuing sound basis for loans and financing."

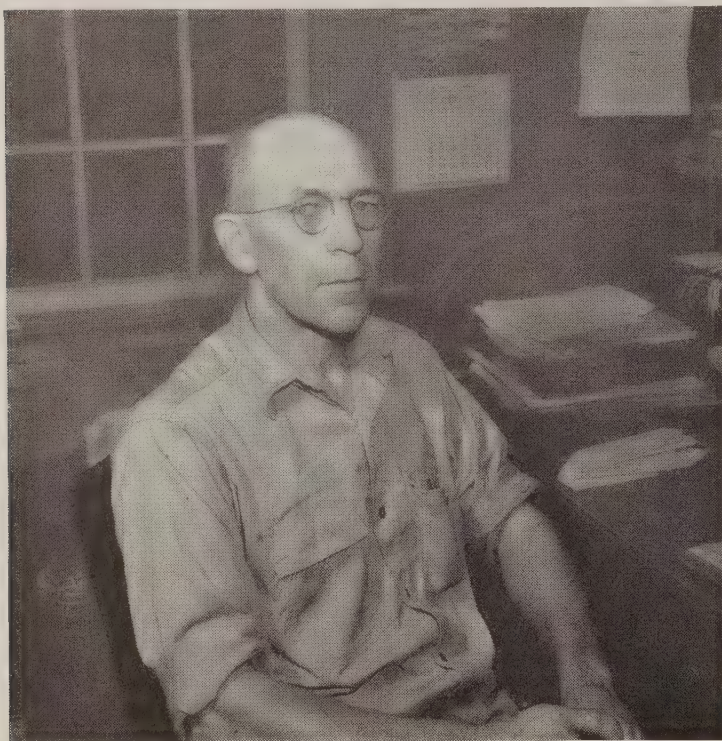
He points proudly to the fact that his home county, Putnam, has the reputation of having more land under approved conservation practices than any other county in Indiana.



W. J. Coad, second vice president.

DISTRICT PROFILE

RITTER of MASSACHUSETTS



Ernie Ritter.

Ernest Ritter, Hardwick, Mass., has been called a "whirlwind" because he does things in agriculture. In another respect, however, Ernie is entirely unlike a whirlwind, because he is constructive.

When soil conservation came to Hardwick and the Northwestern Worcester County Soil Conservation District was organized, Ernie was outstanding among its boosters. He obtained applications for assistance from nearly every farmer in the town of Hardwick—35 of them. And, when Rino J. Roffinoil, the SCS farm planner, started to make complete conservation farm plans for these farmers, Ernie accompanied him to some of the farms and worked with him and the farmers. Later he talked the plans over with most of the farmers and helped get better and more complete establishment. Now, he is secretary of the district, plugging at every opportunity for the establishment of conservation practices.

Ernie is just like that in many other agricultural and community enterprises. For instance, he has been a county committeeman for the USDA's agricultural conservation program since

it was started in the 1930's. He's one of the supporters of the local Extension Service, and he was a member of the war board which handled draft deferments, machinery allotments, and so on.

All this means that Ernie takes on a lot of jobs, among which is the management of the local co-op, the Hardwick Farmers' Exchange. This is the community agricultural organization started in 1914 with the income from a well-invested \$100,000, bequest to the community by Calvin Paige. He was a one-time Hardwick farm boy who piled up a fortune during California's gold rush, when he and his brother, Timothy, sold supplies to miners. Later they added to the profits in west coast utilities.

Ernest Ritter became manager of this Hardwick establishment—the oldest organization of its type in the State—in 1920, shortly after he was graduated from Massachusetts State College. He has become probably the most influential man in the area because of the confidence he has built through his daily activities and in doing business with 90 percent of the farmers in the trading area, selling them grains, fertilizer, seed, and miscellaneous equipment.

Under Ritter's managership, the Exchange developed into a self-supporting and well-paying enterprise that does half a million dollars business annually and returns to members more than is received in interest from the original Paige bequest. Last year this return exceeded \$9,000. Since 1914 more than \$83,000 in patronage dividends has been returned to Exchange members. Within 2 years, this total will exceed the amount of the original Paige bequest.

The Exchange buys grain and other farm supplies in carload lots. It effects a double-barreled saving in buying and in handling. Last year after paying all expenses, salaries, labor, insurance, and so on, amounting to \$10,000, it was possible to return to members a 2-percent patronage dividend on the amount of their individual purchases. To the farmer the net cost of handling a ton of grain was 17 cents. The average Exchange member, Ritter says, buys \$5,000 worth of grain and other supplies a year.

The Exchange has the benefit of a young and a vigorously progressive leadership. The members of the board of directors average 27 years in age and, with Ernie as manager, are constantly moving to more and more successes. The Ex-

(Continued on p. 166)

A FARM IS SALVAGED IN THE PIEDMONT

By CAL L. ROARK



Belly deep in the lush kudzu now growing on class VII land.

IF YOU suddenly came into possession of an eroded, depleted 997-acre Piedmont farm, what would you do with it?

Would you continue to plant 185 acres of cotton and 45 acres of corn each year or give up these crops altogether? And what would you do with all those steep, galled and gullied red fields here and there on the 600 acres of open land?

What about that good job you have? Would you forsake it to take your chances at making a better living on the badly washed, hilly farm?

W. Hugh McGee made these and many more decisions when, 10 years ago, he inherited such a farm at Starr, in Anderson County, S. C. Hugh McGee chose to make that 997-acre place into a

farm that anyone who appreciates farm life would be glad to own.

He determined to put real life into expressions which he had heard and used while earning his bachelor's degree in agronomy at Clemson College and later while he worked with the Soil Conservation Service as a farm planner. Such expressions as "diversification" and "complete farm soil and water conservation" seemed to suggest the best guides for him to follow in his new venture.

And the wisdom of McGee's choice is clearly demonstrated.

I visited Hugh McGee and his farm recently, armed with a dozen or more good photographs taken here and there over the farm showing the condition of the land in 1940. And I cringed as I looked at those pictures before I reached the McGee farm. The land itself seemed to cry out

Note.—The author is information and education specialist, Soil Conservation Service, Spartanburg, S. C.



W. Hugh McGee loves that sericea. Dixie crimson clover recently overseeded.

against its nakedness and scoured condition. Even the eight scrubby-looking cattle pictured on "left out" land seemed to complain that they didn't have a chance. What those pictures told depressed me.

But not for long. As I approached the farm I could see the results of 10 years of wise and loving care.

Proud and stately pines, now 10 to 20 feet tall, covered the denuded earth on steep fields with a blanket of cast-off needles under their evergreen canopy.

Nearby, other fields, not quite so steep or eroded, were healed with that rich-looking legume that is showing its usefulness throughout the Southeast—kudzu. As I passed along the deeply covered hill-sides I imagined that a hard rain was beating down against the big green leaves. I could see, in my mind's eye, the drops hammering away but never reaching the earth until the rank cover of kudzu had tamed each drop, making it move slowly from the leaves, down the stems and through a thick mulch before it even touched the soil.

And on ahead, I saw more gentle slopes covered with a deep blanket of emerald green. Blocky, white-faced cattle grazed there leisurely. The autumn air seemed to freshen the grass, while all about oaks and poplars made ready to sleep for a season. I suspected, but did not know until I was close at hand, that this striking greenness was fescue and clover.

By now I had reached the McGee home, a beautiful structure, well-placed and attractively landscaped. Surely, I thought, this man has managed to make the farm bring good returns to have

a home like this. It was not until later that I learned McGee had obtained lumber by harvesting select trees from his own woodland, by sawing them in his own mill, and by trading this lumber for finished, dry lumber. The home was the result of a remodeling according to plans made by Mrs. McGee.

Hugh McGee was waiting for me. He's a big fellow, self-described as "big enough and ugly enough to be a football player." From then until the close of day, McGee, Technician Brice Latham, and I gave the farm a close going-over.

"My whole farm program is based on putting every bit of land to a use it's best suited for, and then handling it so as to get the fullest benefits," McGee explained. "To do that, I figure I have to go all the way—handle the land so that it gets better and use the very best kind of seed, fertilizer, and livestock."

The herd of 50 purebred Herefords, which had replaced eight grade cattle kept in 1940, was convincing evidence that McGee tried to have only the best.

And the fact that he produces five kinds of certified seed, going every year to the breeder for some new seed, shows he's doing his part to help others get good seed. McGee is president of both the South Carolina Crop Improvement Association and the South Carolina Foundation Seed Producers.

He lists 10 sources of income to prove he is practicing diversified farming. Certified barley, oats, wheat, cotton, and hybrid corn seed account for five of these. Suiter's grass (Kentucky 31), Korean lespedeza, and Dixie crimson clover seed are three other sources. Cotton and cattle complete the list.

His plan to put each acre to its best use and to plant each crop where it can do the best job is in evidence everywhere on that big Piedmont farm.

For instance, McGee decided to plant alfalfa for hay about 18 months ago. He had SCS and Clemson College people advise him as to the type of soil best suited to alfalfa. His conservation survey map, a part of the survey made of the entire county by the SCS, showed him right where to find the "push" soil recommended for alfalfa. And after buying the best alfalfa seed he could find in Kansas, he planted it on 12 acres carefully prepared for producing this crop.



Registered herd sire grazing fescue on farm of W. Hugh McGee.

Terraces and a perennial strip of sericea above the moderately sloping alfalfa field help control soil erosion. During the year, McGee has taken up about 4 tons of hay from each acre, leaving almost a full cutting to remain on the land over winter. He expects to expand his acreage of

alfalfa so as to supply hay for his growing beef herd.

Kentucky 31 fescue (or Suiter's grass), with subterranean clover, Ladino clover, and Dixie crimson clover, now covers 75 acres of both hill and wet bottom land. After 2 years' experience

with fescue, he's thoroughly sold on it as the best grass ever to hit Anderson County.

"I like fescue because I can get away from plowing land and get more grazing more months of the year than with anything else," he told me. "With fescue, I have grazing when I would otherwise be short. When the acreage I seeded this fall to fescue and Dixie crimson is ready to graze, I'll have enough to keep my cattle on pasture all the time. I'm going to continue to give the cattle access to hay and barn space all year long, but I'm counting on them to prefer that fescue."

McGee planted fescue next to each field of kudzu to provide for year-around grazing close at hand at several points on the farm. And there are 40 acres of kudzu and 50 acres of sericea lespedeza that come in mighty handy for summer grazing. Some of the sericea is mowed for hay, and some of the kudzu will not be at its best until this coming summer. McGee overseeds sericea with Dixie crimson clover and ryegrass so as to extend the grazing season on this land.

Pines, kudzu, and sericea, in particular, have done a remarkable job in halting soil erosion on badly washed land. It is doubtful if any other plants could have filled the need for bringing this land back into usefulness. Fescue's ability to grow well on wet land has made possible the conversion of 22 acres of swamp to pasture. Ditches opened with dynamite help drain this land.

Another crop that is playing an important role in McGee's conservation program is Korean lespedeza. On all rotation fields, this crop covers the land 2 out of every 3 years. Only the lespedeza seed is harvested; all other growth is worked into the top layer of the land.

The 30 acres of hybrid corn and 120 acres of cotton that McGee plants each year follow annual lespedeza. He plants small grain after row crops in order to avoid trouble with noxious weeds in producing certified seed.

"I'm trying to get the top layer of the land chock full of organic matter," the Piedmont farmer explained. "That's the real answer to the big problem of getting the soil to absorb rainfall and of reducing runoff."

McGee believes this so strongly that he leaves all of the corn growth on the fields except the grain itself. His corn harvester is rigged so that it picks, shucks, and shells the corn as it moves through the fields, leaving a lot of residue to be chopped into the soil while preparing the seedbed.

But McGee doesn't expect organic matter alone to keep crops growing vigorously. Each year he uses about 100 tons of fertilizer and 40 tons of basic slag. Crop yields reflect the benefits of this and other soil-improvement practices. Average yields to the acre of some crops are: 28 bushels of wheat, 75 bushels of oats, 50 bushels of barley, and 55 bushels of corn.

McGee's entire land improvement program is being carried out in cooperation with the Upper Savannah Soil Conservation District of which he is a supervisor. He and the SCS technicians developed a plan for the entire farm as soon as he took over management in 1939.

EVERYBODY WINS

By LAURENCE T. SMALL



Gottfried and John Bahler on their carpet of Ladino clover pasture, with some of their dairy animals in background.

BELIEVE it or not, in the tidal wave of contests sweeping our country there is one competition in which every entrant really is a winner. Records started in 1947 show that there never has been a loser since the day Governor Dale of New Hampshire came up with the "green-pasture" idea. He tossed out the best hat his money could buy for the Governor of the New England State that produced the top job in pasture improvement.

Every year since, several thousand New England farmers and many others in distant and nearby States have put forth their best efforts in

Note.—The author is district conservationist, Soil Conservation Service, Rockville, Conn.

all phases of pasture improvement. And every one of them has harvested gilt-edge dividends.

Of course, it's swell to win "the hat," or any one of the great number of additional awards now offered on a community, county, State, or regional basis. However, more valuable than any of these, or all of them put together, is the cumulative worth of the increased production on farms belonging to the contestants. It is this sure-fire return that makes the green-pasture contest and conservation farming click faster and faster.

That's the way it was this year with the Bahler brothers, John and Gottfried, of Ellington, Conn., who won third prize in the all-New England contest. This award was nice to get, but more important was the knowledge that "the value of our improved pasture was \$50 per acre above the cost of seed, lime, and fertilizer," Gottfried Bahler says.

Back in 1948 the Bahler pastures won special recognition, above the average but not quite good enough for a prize. The Bahlers determined to do better in 1949. Late in '48 they commenced renovating old pastures and developing new ones for 50 dairy cows and 12 head of young stock. (They also raise potatoes and tobacco on the 124-acre home farm in Ellington and their 150-acre farm in Tolland.)

Much of the home farm's land was wet, drainage being necessary before it could be developed into improved pastures. With the aid of SCS technicians working with the Tolland County Soil Conservation District, a drainage program was



Here's the area drained and improved. The Bahler farm was Connecticut's 1949 Green Pastures winner, placed third in the all-New England contest. Broad Creek was improved to drain the land and provide irrigation water for pastures.



This is former muckland on the Bahler place after it had become an improved Ladino clover pasture. Tractor mower is clipping weeds.

laid out and a mile of ditch and stream channel was excavated during the winter to benefit 25 acres. Stream and ditch banks were sloped and spoil was graded over adjacent muck land to provide a firm seedbed.

Soil samples of spread material, tested at the University of Connecticut, revealed a low fertility. To overcome deficiencies, lime, nitrogen, potash, and phosphate were applied. Then the improved area was seeded with a mixture of 3 pounds of Ladino clover and 10 pounds of brome-grass per acre, with a bushel of oats as a companion crop. Ditch and channel banks were seeded with ryegrass.

The value of early planting was proved under the test of New England's summer drought of 1949. Many of the best of the old-time pastures suffered severely from the burning sun and moistureless soil. However, the Bahlers' seeding had become well established and flourished during the early summer. Controlled and rotational grazing were started in June. Oat stubble and weeds were clipped twice.

In July a 2-year-old Ladino clover seeding in adjacent well-drained soil began to show the effects of the drought. Pasture irrigation was started at once from the deepened and improved stream channel. With ample fertility and the sorely needed moisture, recovery was rapid and the improved pasture area successively became Tolland County's best, Connecticut's best, and finally the third best in all New England.

Gottfried Bahler, who is a supervisor in the Tolland Soil Conservation District, sums it up this way: "In 1949 the value of our improved pasture was \$50 per acre over the cost of lime, fertilizer, and seed. At this rate our drainage project will pay for itself in two more years."

NEBRASKA LAD WINS CONSERVATION CONTEST

WILFRED M. SCHUTZ, 19, son of Mr. and Mrs. Martin J. Schutz, Eustis, Nebr., won first place in the \$15,000 Nation-wide essay contest on "Conservation of Our Soil Resources" jointly sponsored by the National Grange and American Plant Food Council.

Secretary of Agriculture Charles F. Brannan, chairman of the board of judges, presented the awards at a dinner in Washington, D. C.

First and second national prizes were automobiles. Third prize was \$750 in cash, and the fourth prize was \$250 in cash.

Other national winners: Second, Miss Natalie Snyder, 18, Pittstown, N. J.; third, Jack Hardy, 13, Blackstone, Va.; fourth, Mrs. June Thompson McKnight, 18, Street, Md.

In addition to Secretary Brannan, national judges were Dr. Hugh H. Bennett, Chief, Soil

Conservation Service; Mrs. Malcolm Byrnes, president, National Home Demonstration Council, Ethel, La.; Dr. W. T. Spanton, Chief, Agricultural Education Service, U. S. Office of Education; and Dr. M. L. Wilson, Director of Extension Work, United States Department of Agriculture.

Clifton A. Woodrum, president of the council, and Albert S. Goss, master of the Grange, in congratulatory messages to winners emphasized the importance of conservation of our soil resources in a sound land-management program, and added that "all of us look to the youth of the Nation for the leadership and strength with which to build a strong, self-sustaining agriculture, and we believe that this contest has made a substantial contribution to both the thinking and action of young men and women on the important problems of our land and its care."

Officials of the contest estimate that more than 10,000 essays were entered. Entries came from 48 States and the District of Columbia.



Winners and sponsors: Left to right—Natalie Snyder, Pittstown, N. J.; Albert S. Goss, National Grange Master; Jack Hardy, Blackstone, Va.; Wilfred M. Schutz, Eustis, Nebr.; Clifton A. Woodrum, council president; Mrs. June Thompson McKnight, Street, Md.



Conservation of Our Soil Resources

FIRST PRIZE ESSAY

By WILFRED M. SCHUTZ

IN THIS atomic day and age we are inclined to look with horror upon the destruction that can be wrought by atomic bombs, as demonstrated at Hiroshima and Nagasaki. But, sad to say, very few people realize that a single flooding rain removes in a few hours or even minutes countless tons of fertile topsoil, which required many centuries to form. The dropping of the first atomic bomb made headlines in every newspaper in the world, but very little attention is excited by the fact that each year inestimable amounts of the very soil upon which the people of the world subsist is being lost. Something must be done, and done quickly, if we hope to preserve for ourselves and for future generations the oldest possession in the world, the soil. If we are to maintain our position as the "breadbasket of the world," we must begin at once to follow a rigid system of soil-saving operations.

Terracing and contour farming are two of the most important means of checking water erosion. Both of these methods lead the runoff water to a gentler slope, where its progress will be much slower and consequently will do much less damage. The grassing of field waterways is one of the most important and convenient methods of stopping the small amount of washing that might result from terracing, or of holding the soil in waterways where terracing is not practical. Hand in hand with these operations go the practices of mulching to prevent runoff, and the re-grassing of slopes too steep to be farmed without serious depletion of the soil by erosion. The practice of allowing crop residue or mulch to remain on top of the ground is a comparatively simple one. The subsurface is tilled in such a way as to leave the bits of stalks and stubble on the surface of the ground, where they act as a "buffer" to break the force of the raindrops and as a filter to hold back the soil particles if runoff occurs. The grassing of steep slopes in many cases increases the value of the farm by giving it an increased livestock capacity as well as preventing erosion. Strip cropping, as well as mulching and grassing, is an effective means of combating that other great element of erosion, the wind.

The other highly important factor with which we must contend is the depletion of our soil resources through unwise cropping methods. It is estimated that the richest bottom land contains enough nitrogen to grow a 60-bushel-to-the-acre corn crop for 65 years, if it is cropped continuously and nothing put back. This example shows us that we must expect to put something back into the soil if we are to continue to receive profitable yields.

NEW CROPS FOR WESTERN TEXAS

By MORRISON W. LISTON



Charles C. Thompson (left) and Technician Al Robertson examine Thompson's 7-acre planting of Austrian winterpeas near Colorado City, Tex. Cows had grazed the plants almost to the ground in late spring.

In spite of the fact that commercial fertilizers have been an important aid to the farmer in maintaining soil fertility, there is a tendency to rely on them too completely. There is an old Flemish proverb that says, "Without forage, no cattle; without cattle, no manure; without manure, no crops." If it were true then, it certainly is true now. Farmers that specialize in selling only cash crops, and attempt to maintain the fertility of their land through the use of commercial fertilizers alone, are not adequately providing for the needs of the soil. A soil that is in good condition possesses not only abundant fertility, but a satisfactory tilth as well. A good tilth can be maintained only by plowing under from time to time a liberal supply of barnyard manure as well as any crop residue that remains on the land. Tilth is one of the most important determining factors in the ability of a soil to hold water, and hence to check erosion.

A good farmer should not overlook the opportunity of renewing his soil fertility by means of crop rotations, especially a rotation that includes legumes. A well-inoculated legume crop serves a threefold purpose; it greatly increases the nitrogen content of the soil; it helps pulverize the subsoil by means of the numerous tap roots which it sends down, and it is beneficial to the tilth of the soil. All of these make for better conservation of our soil resources.

The idea of the conservation of our soil resources is not a new one, but it is certainly more important now than it has ever been before. Our Nation and the world must realize now that a high standard of living, and a healthy economic status cannot be maintained if our oldest and most important natural resource is allowed to deteriorate. Only through an intelligent system of terracing, contouring, crop rotation, and fertilizing can our present methods of intensive agricultural production be maintained and improved.

SIX-COUNTY DISTRICT.—As a result of a referendum, Wyoming and McDowell Counties have voted to join the Southern Soil Conservation District of West Virginia. This district now includes four counties. With the additional counties, it will become the largest district in West Virginia, which now has two five-county districts. The work of the Pioneer Sportsmen's Club was largely responsible for the successful district campaign in Wyoming and McDowell Counties.

IN THE Mitchell County Soil Conservation District of western Texas, Charlie Thompson's planting of Austrian winterpeas is evidence that this legume, though a newcomer in the neighborhood, has found a new home with job attached.

H. M. Moore's alfalfa has visitors from far and wide coming to check up on the stories they've heard.

And the vetch on the Leslie Hamilton and O. B. Trulock farms is indeed something to write about.

These crops seem to be a three-way answer to many a farmer's prayer in this area where blowing sand is a winter-long problem and where good legume crops are needed in the rotations.

Farmers here have been wanting a crop, too, that would put some 2,000 acres in low, seepy spots into productive use on 200-odd farms. These have been idle, troublesome spots as long as can be remembered.

No one suspected until comparatively recent years that alfalfa, vetch, and Austrian winterpeas might have a place in the Mitchell County Soil Conservation District. It was generally believed that it was too dry for alfalfa or vetch to do well.

NOTE.—The author is district conservationist, Soil Conservation Service, Sweetwater, Tex.



Leslie Hamilton planted this field of vetch 4 years ago on the poorest land on his farm. The crop reseeded itself and furnished excellent grazing notwithstanding dry weather.

And no one gave Austrian winterpeas a thought until Thompson decided to try them.

The recent growing season, of course, was unusually good. You can grow broom handles in west Texas with last spring's moisture. But Hamilton's crop of vetch is 3 years old and it has reseeded itself and produced excellent grazing through some of the driest years Texas farmers have known.

Hamilton planted his vetch at the suggestion of Al Robertson, the SCS man assigned to the Mitchell District. He picked out 40 acres of what he considered the poorest land on the farm to develop for pasture. Erosion, over a long period of clean-tillage, had taken away nearly all topsoil. Hamilton remembered the land as a boy. It adjoined the farm where he lived, and he worked on the place for wages. The land in those years was as good as any in the neighborhood. But yields went down, slowly at first, then rapidly, as wind and rain did their work.

When Hamilton bought the 590-acre farm in 1945, he tried kafir on this field.

"The kafir didn't make enough to harvest," he said. "I put cows in to graze it off."

Hamilton already had talked with the supervisors of the Mitchell district about a farm plan. When he signed an agreement he decided to try Robertson's idea on vetch. He planted the vetch with rye, using 100 pounds of superphosphate.

"It didn't do so well the first winter," Hamilton reports. "But the next 2 years I grazed up to 45 head of cows and calves on it and it kept on growing in spite of the dry weather."



A 36-inch hairy vetch plant is held by O. B. Trulock. The 11-acre field yielded 4,700 pounds of seed in 1947. He planted the vetch-rye combination in a low, troublesome area that had produced nothing as long as Trulock had known the place.

Trulock also planted vetch at Robertson's suggestion. He especially wanted to control the blowing on a 40-acre field on his big farm. He used a 3-to-1 ratio of rye and vetch, fertilizing with superphosphate at 200 pounds to the acre.



H. M. Moore stands in heavy alfalfa in field that produced 202 bales of hay to the acre in 1948 after having given 4 months of profitable winter grazing. Moore looks across fence at white, blowing sand and recalls that his alfalfa land looked the same way 3 years ago.

An 11-acre planting of vetch on Trulock's place is something the neighbors marvel at. As the stand improved in the fall of 1946 he put five horses and five cows on it. He added more cows as the growth gained. Trulock grazed the 11 acres from December 1946 to March 1947, then let it make seed. He harvested 4,700 pounds of seed.

Trulock usually has about half of his 3,171-acre farm in cotton. He is extremely interested in a crop that will work in rotation with his cotton. The cotton land has 125 miles of terraces. But nearly all the land is subject to blowing and that is another reason for his interest in vetch. He believes the legume may occupy an important place in his coordinated soil conservation program.

Moore's alfalfa is on a farm just north of Colorado City in the same district. He bought the place in 1945. A 30-acre field was a strip of white, constantly moving sand and appeared to be almost worthless for cropping. However, Moore put alfalfa on it in 1945 just to give it a try. Robertson had advised an application of 100 pounds per acre of superphosphate. Moore reasoned that 200 pounds ought to be twice as good. He may have been right, at that. His alfalfa is the envy of farmers for miles. He cut it six times in 1948, getting a total of 202 bales to the acre.

"I could easily have had another cutting before frost," he said. "And 1948 was a very dry year. Ten acres of the 30 gave me 2,162 bales."

In the winter of 1947-48 Moore had 33 head of steers on the alfalfa. They averaged 300 pounds when he put them on, and when he sold them the following April they averaged 600 pounds.

Moore plans to expand his alfalfa acreage. It's his most profitable crop.

Thompson planted Austrian winterpeas in October 1948 on 7 acres of "dead land" that had not been in cultivation for 10 years. It was a trial planting. His brother, Wiley B., who farms near Stephenville, had bragged on the crop and helped Charles get some seed.

The winterpeas were in a field with a planting of rye and another of wheat. Early in December the peas, wheat, and rye were ready for grazing so Thompson turned in 50 head of cows and heifers. A little later, when the crops appeared to be gaining, the number of grazing animals was increased to 100.

When Thompson checked from time to time on the stock, he noticed that they always appeared to be eating winterpeas instead of wheat and rye. Before he realized it, the animals had grazed the stand of peas almost to the ground. He thought he had let the grazing go too far and took the cows off. However, before he knew it the peas had regained their vigor and growth.

"That's a crop I think we can bet on in this country," Thompson says. "It's going to have a place in my conservation program."

Thompson long has been an ardent supporter of soil and water conservation. In addition to his practice of law in Colorado City, he is president of the City National Bank, chairman of the board of Regents of Texas Technological College at Lubbock, and vice chairman of the Farm Credit Board of Houston. His 5,700 acres of farm and grassland are under agreement with the Mitchell County district and he is getting along with his program as fast as manpower, equipment, and growing seasons will permit. He is always eager to give a new crop a try.

He proudly shows the visitor his 10-acre planting of weeping lovegrass, his orchard, his 900 acres in pasture and the soil-improving crops.

EXCELLENT IDEA.—Early in 1949 the Agricultural Committee of the West Virginia State Bankers Association urged its local members to join with district governing bodies to help get the SOIL CONSERVATION Magazine into the hands of district cooperators. It is currently reported that several hundred cooperators are now receiving this magazine every month.

THE SOIL IS DARKER—YIELDS ARE UP

By ROY E. BALLARD



Leland Warner's big gully as it looked in June 1946, about the time stabilization was getting started but before locust trees were planted.

MUCH of New Jersey is so flat that many a farmer finds it hard to believe that his land has a serious erosion problem. He doubts that the State is losing any soil except perhaps along the ocean and on the Delaware River and bay fronts, where there are a lot of vacationing city folks but few farmers.

But Leland Warner, who owns and tills 116 acres near Woodstown, in Salem County, sees things very differently. Since 1945 he has had a complete conservation farm plan which, he says, "has given me a peace of mind that I never had before and has enabled me to sleep peacefully at

night when it is raining hard, because I know my farm is not washing away."

In the last 5 years, while old timers scratched their heads and looked on in wonderment, Leland Warner has completely rebuilt his badly eroded farm, a farm that was producing less and less crops at more and more cost, into a very productive farm.

In this process, Warner licked a lot of tough problems. Take, for example, that big gully—200 feet long, 40 feet wide at the top, and 18 to 20 feet deep—and several other smaller gullies, 4 to 5 feet deep, right in the middle of his cropland. Runoff from storms, and winds, made them, and they were steadily becoming bigger and bigger.

Note.—The author is work unit leader, Soil Conservation Service, Salem, N. J.



Contour strips in 2-year rotation of tomatoes and wheat. Warner's big gully, now stabilized, starts over at the right.

When harvest time came it was necessary to carry along shovels, because the gullies had to be back-sloped and filled before tomatoes and other crops could be gathered from the fields.

From the fields that washed through these gullies vital productive elements were being swept away. The acidity of the soil had become very high, as indicated by a pH range of 4.0 to 5.0, not uncommon for soil in that area under similar conditions. The organic content was down to less than 1 percent and the soil was tight and compact. Plowing, disking, and other cultivating were hard to do. There were no earthworms—the plowmen of Nature—and the color of the soil was abnormally light, as if it were bleeding to death.

In these fields, tomato yields from 1942–44 were down to an average of 9.5 bushels per acre, with 10.5 the maximum. In 1933 the fields had produced 25 bushels of wheat per acre. When Warner quit growing wheat and substituted white potatoes in long rows up and down the grades, his production became worse instead of better, while production costs kept mounting.

When it rained at night, back in 1942–44, Warner says he could not go to sleep because he was disturbed by what was happening to his land. He was ready to do anything that would put him on a better production basis and turn his losses into profits.

About that time Salem County became a part of the South Jersey Soil Conservation District, and with this came Soil Conservation Service technicians. They were ready to cooperate with farmers and help solve problems such as Warner's.

At the request of the district supervisors early in 1945, technicians in the Salem work unit made a study of Warner's farm to determine the condition of the land and the degree of erosion in every

field. Later, with Warner's help, they developed a complete conservation farm plan for all of his acres. Warner got busy and put the plan into operation. Making use of his tractor, plows, and other farm equipment and labor, he built diversions and outlets, established contour planting and strip cropping, and started crop residue management, rotation, and cover-crop programs. In the most severely eroded areas he began reforestation with seedlings obtained by the district. His cash outlay for the whole installation was only \$4—\$2 per day for 2 days' use of a blade rented from the district and used with his tractor.

He adopted a 2-year rotation system—tomatoes followed by wheat into which timothy and red clover were seeded. In the fall, after tomato harvest, he disked the residue into the soil before seeding wheat, plus 3 pounds of timothy per acre. Late in the following February he broadcast 10 pounds of red clover per acre. When he combined the wheat, he left the straw on the ground. With the red clover and timothy, it formed a good protective fall and winter cover. In the spring of the third year the cover was plowed under before he set tomatoes in the second cycle of rotation.

Through this system Warner harvests a cash crop from his entire farm every year, keeps a cover crop on the whole farm every winter, and turns a mat of clover and timothy into each cultivated acre every second year.

To meet the soil's need for plant food, he applies enough lime to bring the pH count to the 6.0–6.5 range. For tomatoes he applies 1,500 pounds of 5–10–10 fertilizer. For wheat he uses 300 to 500 pounds of 4–12–8.

With his complete conservation farm plan hitting on all cylinders for sufficient time to prove its real worth, Warner now has a better farm than he ever had before, and it is producing so abundantly.

dantly that it seems almost like a miracle. About 90 percent of the farm is contoured and approximately half is strip-cropped. Topography of the other acres is such that use of contours and strips is not necessary. Diversions are fully vegetated. The 4- to 5-foot gullies have healed. Through normal cultivation the soil there has been leveled and no longer is it necessary to make back-fills so they can get the crops out of the fields. Equipment moves over it with ease.

At the head of the big gulley, contoured strips handle the rainfall so effectively that there is no need to install mechanical devices for control of runoff. There just isn't any runoff. In the bottom, about 100 locust trees have been started, and at each side above the gully, Warner has taken a half-acre strip out of cultivation and started reforestation.

Yields are uniform. In poor areas that produced only 10 percent as much as good areas in preconervation farming years, the yields are now 80 to 90 percent of what those good acres produce, and are still climbing. Tomato yields have jumped to an average of 13.8 bushels per acre, with a maximum of 15 bushels. Fields that produced 25 bushels of wheat per acre in 1933 hit an average of 35 bushels per acre in 1946, 47, and 48, when the maximum yield was 42 bushels per acre.

Many other benefits are noticeable. The soil is darker—close to natural color for the type. It is more friable, and cultivation is easier and costs are less. Organic content has increased from less than 1 percent to about 2 percent. Earthworms are abundant. Rainwater that formerly fled over his fields and slashed out the gullies is largely retained right where it falls. No soil is being carried away. Full benefits are being obtained from lime and fertilizer.

Leland Warner delights in putting on his raincoat and boots and going to his fields during a heavy storm, to smile over the efficiency of his controls. What's more, he gets an extra wallop out of what's happened to 10 acres of land, slightly more than 8 percent of his acreage. It had been so badly eroded that use of it was abandoned. Now it has been reclaimed and is back in cultivation and production.

"Sure, there's plenty of erosion on most south Jersey farms, but there isn't any on *my* farm any more," he exults. "Erosion can be licked, and lost productivity can be recaptured, if methods now available to all farmers are used. It is just a case of making up your mind that you are going to do it, then doing it. That's what more and more Jersey farmers are finding out every year."



Contour plantings of tomatoes on one of the less eroded fields.

REVIEWS

POSSUM TROT FARM. By Leonard Hall. The Caladonia Press. St. Louis. 1949. 161 pp. Illustrated.

The only trouble with a book like this is that you enjoy it so much you hate to come to the end.

I suspect most people develop a sort of picture of the places they read about, such as Possum Trot Farm. Somehow to me it is a place where you can enjoy yourself even by just sitting around looking out of a window at this and that. As a matter of fact, I have just been looking out of some of the windows of the author's house at a variety of interesting things, although I have never seen the house or so much as 1 acre anywhere near it. I have seen much of the Ozarks, however, and it isn't at all difficult for me to get into the spirit and point of perspective to understand and enjoy all that Leonard Hall has put into this book—to visualize the landscape by way of the imagination—and get a great deal of pleasure out of it.

—H. H. BENNETT.

BOBWHITES ON THE RISE. By Verne E. Davison. Charles Scribner's Sons. New York. 1949. 150 pp. \$3.75.

It is unfortunate that such books must cost so much, for here is one that is needed by a host of people. It tells landowners of the Southeastern States how to fit quail management into farming and forestry practices by creating food and cover on areas that have no better use.

Food abundance in much of our quail range is an illusion, says the author, and we are learning to provide it through the use of bicolor lespedeza, a leguminous shrub that bears seed crops reliably from Virginia southward. One of the best locations for bicolor is on the sapped borders of woodlands, where it may be combined with a turnrow of sericea lespedeza. In open pine stands of the South a ½-acre strip of bicolor provides support for one wintering covey. Hedges of bicolor and/or multiflora rose hold promise, but new patterns need to be tested. Intelligent and strictly controlled burning is given cautious approval for some southern forest types.

The book deals with less certainty on northern quail management, although the principles hold. New strains of bicolor are in the offing—that will fruit early and miss the frosts. For the entire quail range, the soil conservation district is emphasized as the best means of getting improvements onto the land.

This management guide is quite as important for the things it says not to do: In this field it can serve the sportsman who is willing to learn, and it applies no salve to the prejudices of those who will not. Rearing a few quail in your back yard is a pleasant hobby, says Verne Davison, but artificial stocking of either reared or transplanted birds is not the way to manage quail. Rather, create the conditions that produce coveys where there were none before and you've done something. Refugees are not effective—make all the land productive.

Predator control is unimportant. Winter feeding has no place in a realistic more-quail program. As for annual food patches of mixed grains, "You should never plant these confounded mixtures."

The author may have some misunderstandings over terminology. When he debunks the idea that "Nature will provide," he is not deriding the productivity of wild populations or the utilization of biological forces. His point is that conditions developing by chance on the land will not given maximum quail production. The entire book is based on the proposition that Nature *will* produce if given the opportunity via a deliberately planned economy for the bobwhite.

The opinions and attitudes so strongly stated in this book are good. They are soundly based upon the most modern concepts of population biology. They will be alive and producing fifty years from now, albeit with a new look here and there. It is satisfying to the ecologist to read a book that recognizes animal numbers as a measure of the environment, to be regulated by controlling the conditions that produce them. When the quail population of the entire range is estimated at 60 million, the figure is realistically designated a *fall* estimate. So often this is ignored!

A point of emphasis in this work is the role of the landowner as the producer and custodian of game. If this key individual is ignored and not encouraged or helped, it matters little what the State game department may do. Recommended legislation would make the hunting license invalid *without the permission of the landowner*.

There is no implied claim that the present publication is the last word on quail management. In fact its techniques are presented as being in the developmental stage. For the most part they are not proved by quantitative measurement, but Mr. Davison's position as regional biologist of the Soil Conservation Service in the Southeast has enabled him to help landowners try both plants and patterns on farms and quail preserves, and he has seen them work. That they will work even better as more is learned is a part of his thesis, and we have the feeling that he is not wrong in his infectious faith.

—DURWARD L. ALLEN, biologist, Fish & Wildlife Service.

DISTRICT PROFILE—Ritter

(Continued from p. 152)

change owns a railroad siding warehouse, a store in the village proper, and an office building.

Under the Paige bequest, the fund trustees, Exchange directors, and Ritter have the responsibility of providing an annual series of free public lectures on agricultural, floricultural, dairy, and poultry subjects. This provision was written into the Paige bequest for the purpose of "rousing and stimulating further interest in farming pursuits and domestic industries." Ritter, who most actively oversees and pursues the idea behind the original bequest, says that "as long as agricultural furtherance is the goal, the Paige fund remains as a solid bulwark against almost any foreseeable change in the town's dairy-ing progressiveness."

—HUGH F. EAMES.

NOTES FROM THE DISTRICTS

ORGANIC MATTER RETURNED.—As far as Wayne Chaney is concerned, soil conservation and good farming are the same thing. Practices on the approximate half section of dry cropland he farms near Haxtun, Colo., include strip cropping, crop residue management, and grass planting. One of the most important things he is accomplishing is getting back some humus into the soil.

Chaney, who is cooperating with the Haxtun Soil Conservation District, explains that the great majority of fiber had been burned out of his soil by some 50 years of alternate cropping to wheat and corn with little attention to what this mining was doing to the soil.

With restoration of organic matter in mind, he started out with crested wheatgrass plantings with the idea of using grass in a rotation, plowing up a pasture after about 5 years. However, beef cattle on these crested wheat pastures have done so well that more and more of his land is going into grass.



Chaney also has 170 acres of native pasture for summer use. His cattle go on this after they come off the crested wheatgrass in the spring. He has seeded 40 acres on one end of this native pasture to crested wheatgrass—this was a patch of nothing but white blow sand. Sorghum grown on his cropland for roughage to carry his cattle through the winter completes his year-around cattle operation.

On his strip-cropped land, subsurface tillage is doing the job of getting fiber into the ground. Every stalk of wheat stubble, for instance, is worked back into the surface.

Commercial fertilizer is something that Chaney gets almost as enthusiastic about as he does his grass. Most of his corn was fertilized with an 18-9-0 mixture (18 parts nitrogen, 9 parts phosphorus, no potash) last spring. Maturity of the fertilized corn was 10 days to 2 weeks ahead of that which was not fertilized. Chaney says this is due chiefly to the fact that the fertilized corn got a 10-day to 2-week earlier start in the spring. It just sprouted and grew that much quicker, and it held the advantage all through the season. He figures to get 6 to 10 bushels more corn per acre from the fertilized corn. Six rows down through the middle of the field were left unfertilized and the difference is readily seen at a glance.

On his strip-cropped land where his rotation is corn, fallow, and wheat or rye and feed crops, Chaney's corn yield is now twice what it used to be on straight continuous cropping. That's one of the reasons he says soil conservation means the same thing as good farming—it pays.



GOOD CHECK.—The Commercial National Bank of Nacogdoches, Tex., has found that the conservation of soil is good not only for the land but for business in town as well. So the bank is calling attention to the value of soil conservation. Across all its checks is printed: "Soil conservation is necessary for permanent prosperity."

1 TO 1,000 FARM DAY.—As a part of the annual observance of "Pennsylvania Week" Governor James Duff helped the York Soil Conservation District celebrate "1 to 1,000 Farm Day," marking the acceptance of a complete conservation farm plan by the thousandth York County farmer. The 2-day event included visits to the farm of Gibson Strickler, the No. 1 cooperator, who still is an active conservation farmer; and the farm that Donald Harlacker recently purchased and for which the thousandth plan was prepared. Strickler and Harlacker participated in a coast-to-coast broadcast. The occasion drew a lot of Pennsylvania and Maryland newspaper space and radio time. York County, organized as a soil conservation district in October 1938, is the first county in the 12 Northeastern States to cut the thousandth notch in its achievement stick. Pennsylvania's Clarion County Soil Conservation District hit the 1,000 mark a few weeks later and gave special recognition, by newspapers and radio, to David H. Whitemore, No. 1,000 cooperator. The Lancaster district is very close to the 1,000 mark.

TEXAS GRASS ENTHUSIASTS.—Two small grass nurseries owned by J. G. McBride and Andy Harvil are helping to stimulate interest in range grass reseeding in the Aqua Poquita Soil Conservation District in Texas, with which they are cooperating.

McBride, first cooperator in the district to plant King Ranch bluestem, and Harvil, who has his nursery in his garden, have just about every specimen of native grass found in Texas. Both men have also introduced new grasses to the district through their nurseries.

WATER WORKS WONDERS.—A 2-acre orchard on the Wagon Wheel Ranch, a combination farm and summer guest ranch 6 miles south of Showlow, Ariz., is owned by Dr. Earl C. Dohner. It is now being irrigated efficiently for the first time as a result of a soil and water conservation program.

Dr. Dohner is a dentist and doesn't have time to look after his farm, so this work is done by Mrs. Dohner, her daughters, and a hired hand.

When the Dohners applied to the Navajo County Soil Conservation District for assistance in planning, their



most pressing problem was what to do about the irrigation system in the 9-year-old apple orchard.

SCS technicians found that the orchard had been planted in straight rows on an irregular slope, with the result that each row of trees ran up and down the hillside. The irrigation ditches running down the slope had become gullies, and the water ran down so fast that it didn't have time to seep into the soil.

The technicians made a topographic map of the orchard and planned a head ditch to run down the highest ridge. Concrete drop structures to control the flow of water then were installed at each vertical drop of 1 foot. The Dohners rented steel forms from the district for making the concrete drops.

The orchard then was benched across slope at two levels between each two rows. They amounted to two wide-bottomed furrows about 5 feet wide. This makes it possible to irrigate the trees on both up-slope and down-slope sides. Forty-four turn-outs then were installed in the head ditch, one for each bench or wide-bottomed furrow. The entire orchard is to be seeded to a mixture of alfalfa and brome-grass to provide a cover crop and hay.

Now the Dohners can irrigate the orchard and garden in 2 hours. Each tree is properly watered. A good apple crop resulted this year. Best of all, the loss of valuable topsoil has been halted.

CURBSTONE SALESMEN.—In Texas, grass is one of the most important crops. It is small wonder, therefore, that the sight of grasses growing in front of Soil Conservation Service headquarters at Jacksboro should excite the attention of both visitors and passers-by.

Here we see District Conservationist J. C. Porter (left) explaining the characteristics of Indian grass to Norman Munster of the Budget Bureau, Washington, D. C. The other grasses are King Ranch bluestem (left), big bluestem, and little bluestem. Porter brought the native bluestem and Indian grass plants in from sites nearby. Switchgrass and side-oats grama are also in the sidewalk plot but are not shown in the photo.

King Ranch bluestem is an introduced grass which is proving of great value in erosion control and in range and pasture improvement. Munster stopped by the Jacksboro office on a trip to see flood-control work in progress in the Trinity River watershed. In the area he saw the tall-growing bluestems, Indian grass, and switchgrass on ranges that appear much the same as in buffalo days. Farmers and ranchers especially are interested in the grass display, and Porter suspects that information they got in asking about the grass may account in part for the 150,000 pounds of native grass seed harvested recently in the area.



Irrigated Potatoes

MARCH 1950

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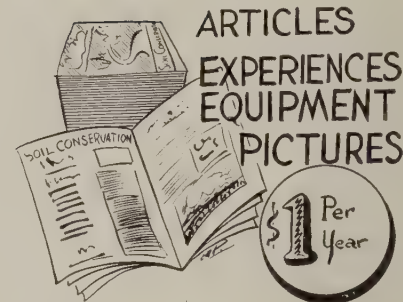
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☆ THIS MONTH ☆

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

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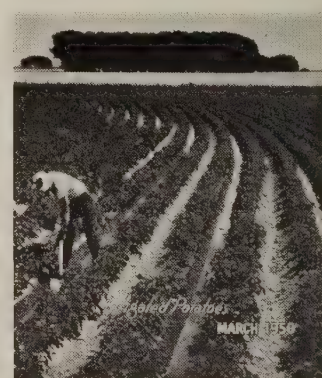
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ASSOCIATION RECOMMENDS MAGAZINE.—In a report to the Washington State Association of Soil Conservation District Supervisors, President R. B. Webb makes the following suggestion:

"If you are interested in soil and water conservation, I suggest you subscribe to the SOIL CONSERVATION Magazine. This is the very best publication of its kind and the subscription is only \$1 per year for the 12 monthly issues. It is written in popular nontechnical style. There are about five feature articles each month, as well as short items from all parts of the country. There are articles about soil conservation districts; individual farmer experiences; new conservation equipment; and grass, legumes, trees, etc. The magazine includes many fine pictures.

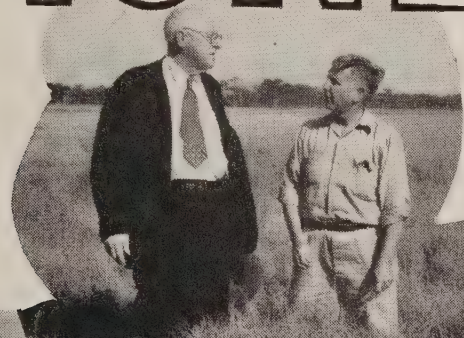
"In addition to each district supervisor subscribing, the district might give subscriptions to new cooperators, or as prizes, or to schools."



FRONT COVER.—Russell Baum is seen irrigating potatoes grown on contour on his father's farm 4 miles east of Ashton, Idaho, in Fremont County. In the background may be seen golden wheat protected by an excellent windbreak.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

PIONEERING *in Grass*



Above: Hugh Bennett, chief of the Soil Conservation Service, and Colin D. Gunn, State conservationist, in a field of Pangolagrass which W. H. Harrison saved for a nursery. Left: Carpetgrass being plowed up on Harrison ranch in preparation for better grasses. Right: Purebred brahmas on Pangolagrass pasture.

By R. Y. BAILEY

UNTIL very recently most local cattlemen took a slim view of the possibilities of growing better grass on the old prairie lands of south Florida.

It was in 1945 that Jim Weir and Eddie Myers helped to plant the first patch of improved grasses on the Parker Brothers ranch. Cowboys watched them skeptically—and why not? It had been common practice since the country was settled to burn the range lands at the time experience had shown was best for greening up the grass. They had built a big cattle business on these unimproved ranges. Also, the climate was against the production of the improved grasses that were known up to a few years ago. During the rainy season in the summer, they got too much water for pastures and during the fall and winter dry season they often had a problem of getting enough water even to keep cattle alive.

Some of the Florida cattlemen believed something better could be done down there. They acted on this belief by organizing soil conservation districts and calling on the Soil Conservation Service for help. They were willing to try a little of almost anything that was suggested. The

big rub was that we didn't know very much to suggest.

We knew there were some differences in sandy soils and that some of them made better pasture than others. We knew that some of the new grasses like Pangola, Coastal Bermuda, and Pensacola Bahia might grow, if given proper treatment. But, we didn't know what that treatment should be. We were desperately in need of information that would work under these conditions.

H. B. Helms, assistant State conservationist, asked me to go and help them study the problems in south Florida. We went out into these districts in the winter of 1945 during the dry season and then followed up in the midst of the summer rainy season. We studied the possibilities of growing grasses of different kinds on the different sandy lands. We talked to local technicians who had been on the ground for a few months and to some of the cattlemen who had been there all their lives. We studied the grass where certain kinds of native vegetation was growing and tried to determine where the better grasses were most likely to grow.

Soil scientists who were making the conservation surveys contributed valuable information about differences in some of these sandy soils.

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Spartanburg, S. C.

Some of these differences would escape the notice of others, but they meant something to these men who were trained in the science of making conservation surveys.

These studies led us to believe that we could help farmers pick the kinds of land that were most likely to grow the different grasses. For example, we believe the better areas, where cabbage palm and certain other native plants indicated better-than-average conditions, would be most likely to grow Pangolagrass. Pensacola Bahia had grown on some very poor, light sands and we thought it probably would grow better on the lighter, poorer land than almost any other improved grass.

We were sure that improved grass would require fertilizer, and probably lime. But we didn't know what kinds and amounts would be needed. Helms worked with the late W. E. Stokes, agronomist at the Florida Agricultural Experiment Station at Gainesville, and developed detailed plans for field trials. Local personnel in the districts selected farmers who were interested and who were willing to cooperate in putting on trials that would include several different grasses, with varying kinds and amounts of lime and fertilizer. Work unit conservationists and other field workers usually helped apply the lime, minor elements, and fertilizer, and plant the grass.

A great deal was learned from these field trials of 1945 and unbelievable progress was evident in February 1949, when I accompanied Helms, Zone Conservationist Frank Daughety, District Conservationists Dave Pittman and Jim Weir in a study of progress in the Lakeland and Arcadia work groups. Palmetto brakes had been cleared, a ton of ground dolomitic limestone and 400 to 600 pounds of complete fertilizer and a few pounds of copper and zinc per acre had been applied, and improved grasses planted.

In general, Pangola, or sometimes Coastal Bermuda-grass, had been planted on the better areas and Pensacola Bahia on the lighter, poorer sands. Results in most cases were so astonishing as to be almost unbelievable. Pangola or Coastal Bermuda-grass was mowed in July, scattered over the surface, and disked in. Usually afternoon showers may be depended upon to insure moisture for the grass cuttings. Fields that were planted in July were knee deep in Pangola by November.

Pensacola Bahia is a somewhat slower starter,

but where seed was sown during the rainy season in 1948 there was a fair stand of grass the following February. This new grass may be expected to cover the ground completely and furnish grazing the summer after it is seeded.

Much remains to be learned about the maintenance fertilizing and liming that will be needed to keep these improved grasses. Some of the local people believe that under their conditions, where the ground often is covered with water several weeks at a time during the rainy season, lime may be needed oftener than once in 5 years as we usually recommend in other areas.

Complete fertilizer at rates of at least 400 pounds per acre annually most likely will be needed for maintenance of grass stands. Some of the minor elements also will be needed. If a legume can be grown with these grasses, it may be feasible to leave the nitrogen out of the fertilizer. If pure stands of grass are to be maintained, it is logical to expect that nitrogen will be needed. Top dressing with nitrogen fertilizer in addition to the complete fertilizer may become a profitable practice.

What do the cattlemen think about these new grasses? H. W. Harrison, a rancher at Palmetto, Manatee County, is expanding his acreage of improved grasses and is very positive that these better pastures will pay. In February he showed us a group of mature bulls that had been wintered in good condition entirely on Pangola and Pensacola Bahia grasses that were protected from grazing during the latter part of the rainy season so that they made heavy top growth. This system of wintering cattle on standing, dry grass may be one of the most important developments in cattle production and pasture improvement in southern Florida.

Harrison's plan, as it is being developed on the ground, is following a pattern of using the better lands for Pangola and the poorer sands for Pensacola Bahia. He also plants "torpedo grass" (*Panicum repens*) around the edges of ponds and likes this grass for such sites.

I asked Harrison which two grasses he would choose if he could have only two. After a thoughtful pause, he said, "Give me three, Pensacola Bahia, Pangola, and torpedo." Incidentally, torpedo grass is considered a rather dangerous pest if it is allowed to get into cultivated land. Several of the cattlemen of southern Florida like this grass, particularly for planting around pond

borders, and are using it rather extensively on these wet sites.

H. H. Parker, who is head of Parker Brothers big ranch, thought enough of the idea of making better pastures to hire Eddie Myers, former work unit conservationist at Arcadia, to help carry out the soil and water conservation plan that Myers had helped prepare. While we were there in February a specially built plow was cutting the scrub palmetto a few inches below the ground line. A heavy disk was following to chop and tear up the palmetto further, in preparation for establishing part of the thousand acres of new pasture that is the annual goal on this ranch.

A battery of truck spreaders was distributing maintenance fertilizer on pasture that was established in 1947 and 1948. Parker is watching these improved pastures very closely and is checking his returns to see if they are going to pay. He told me that he was beginning to believe it might pay him to put on two applications of fertilizer each year. This is a long way for a cattleman to go from the old practice of using only the native grasses on the unimproved range.

Parker was very proud of one field where about a hundred bulls had been wintered in good condition on Pensacola Bahiagrass and Pangola. The only other feed these bulls had was citrus molasses, a byproduct of citrus juice plants.

He likes what he has seen to date, but Hooker Parker has not let his enthusiasm for better pastures make him forget that he is spending good money in the development of these pastures and that the extra grazing must pay this money back with a profit. If the pastures pay, he will continue to increase the acreage in improved grasses. His faith in what is being done is worth a great deal in getting a soil and water conservation program properly planned and developed in southern Florida. He has been a supervisor of the Peace River Soil Conservation District since it was organized and his influence is important over that part of Florida. If Hooker Parker tries new pastures and likes them, that is going to be good enough for many others.

The dry winter climate makes the use of winter legumes a very uncertain practice. This leaves summer legumes as about the only hope for adapted legumes to grow with grass on the greater part of the land in southern Florida. Hairy in-

(Continued on page 174)

POTTER DISTRICT NURSERY

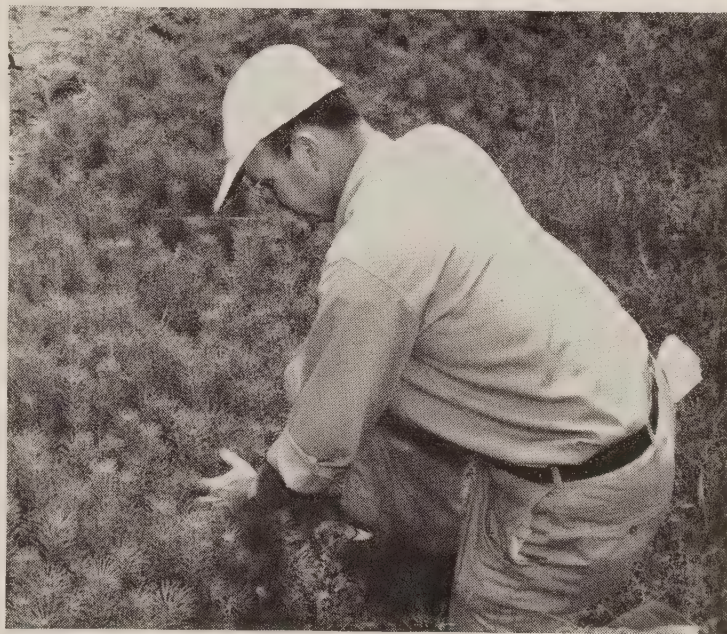
By VERNAL C. MILES

WHEN a new spring comes to Pennsylvania's northern tier, Potter County Soil Conservation District, at Coudersport, and its cooperators will start to collect dividends from the district's tree and shrub nursery, a shrewd investment made for the organization by two of its directors, Ed Fisher and Rosell Leete.

This unusual district enterprise, now getting ready to produce its first crop of 50,000 seedlings, represents realization of an idea pondered a long time. Fisher finally made its fulfillment possible when he supplied the site, labor, and equipment needed to plant the Scotch and Austrian pine seed which Leete purchased to seed 4,500 square feet of bed.

Every spring, starting in 1950, the beds will turn out at least 50,000 seedlings for sale to cooperators at a price that will eventually repay the original investors, purchase seed for following years, and turn a modest profit that will be used in other directions advantageous to the district. Cooperators henceforth will be supplied at small cost with sturdy seedlings for reforestation and planting stock for Christmas trees.

NOTE.—The author is district conservationist, Soil Conservation Service, Coudersport, Pa.



"Corky" Miles checking up on third-year growth of Scotch pine in Potter District nursery near Coudersport, Pa. It will be ready for cooperators' use in the spring of 1950.



First-year growth under snow-fence protection.

The project had its inception in 1946, when the outlook for desirable tree seedlings for reforestation was dim, Christmas tree seedlings were scarce and high-priced, and the district's pocketbook was as flat as a worn dime.

Operations began on Memorial Day in 1947, when Fisher turned over the use of a class I, well-drained piece of land, comparatively free of stone, at an altitude of 2,400 feet. Normally it was suitable for potatoes, of which Potter County produces a justly famous crop. Ground used for potatoes in 1946 was chosen to get the benefits of fertilizer remaining in the soil, and the scarcity of weeds following a close-tilled crop. Preparation of the seedbed had been delayed until Memorial Day because of the need to time planting so that germination would not take place before the last freeze or frost, which usually occurs in Potter County the first week in June.

After the ground had been thoroughly disked, the seedbeds (3 feet by 250 feet) were broken with a two-bottom plow and crawler tractor. Inside track width of the crawler determined the width of each bed thrown up in one round trip by the plow. A once-over with a cultipacker firmed and leveled the beds, and a rough raking took out the few stones. After careful measurement to determine the seeding rate, the seed was broadcast, then firmed in the bed by another once-over with the cultipacker. A straw mulch then was applied before sections of snow fence, borrowed from the township, were rolled over the beds. Two men did all the work in 6 hours.

Twelve days later, after germination had taken place, the snow fence and mulch were removed.

A single strand of wire was looped around stakes and run around each bed about a foot above the top of the soil. The fence was re-laid on the wire to give shade for the young growth. Later, when the growing season had ended, the fence was removed and returned to the township for another winter's job along the highways.

Since 1947 new plantings have been made each year and Banks pine and multiflora rose have been started. The district directors and SCS technicians interested Coudersport High School boys in assisting with the work. They began as helpers for Fisher's men and have now completely relieved them and are handling all of the work, and liking it a lot.

No water has been applied, all moisture coming directly from the sky. Root growth the first year was three times greater than top growth. Next spring when the first seedling crop is lifted, the Scotch pine will average 14 inches in tops and 12 inches in root length, while the Austrian pine will be 12-12. The seedlings have a good diameter and are sturdy all-around growths because they have not been crowded in the beds.

There's room for more beds in the same field, whenever the demand for planting stock exceeds present production and justifies expansion. Ed Fisher and Rosell Leete are watching developments as closely as they scan their splendid crops of potatoes and other farm crops.

PIONEERING IN GRASS

(Continued from page 173)

digo appears to be the most promising legume that is available now. It grows on poor, deep sands where most of the other summer legumes fail, and reseeds itself. Something must be learned about its management in combination with the grasses, but progress is being made.

They've come a long way since 1945. They have a great deal to learn yet, but the people in southern Florida are "in the grass" to stay. They'll solve their other problems of fertilizing, grazing management, and the use of legumes with their grasses, just as they've learned a lot of the things they are now practicing—through field experience. Technicians and farmers have worked together and learned from each other while they were pioneering in grass.

CONTOURING SAVED THESE MICHIGAN ORCHARDS



Frank Lotyuk, of the Soil Conservation Service, and Elmer Kesterke check tree spacing in rows of orchard contoured in the fall of 1949.

By JERRY KRIEGER

WHEN Elmer Kesterke bought his farm in the hilly area south of Berrien Springs on the south side of the St. Joseph River about 14 years ago, he spent more money than he could afford getting a tractor with enough power and traction to pull a plow in his steep orchards.

First he bought a big steel-wheeled tractor, then he got a set of rubber tires for it, and finally a dealer brought out the biggest wheel tractor made at that time. All of them failed to get a two-bottom plow over some of the bad spots on the uphill pull. So Kesterke finally had to buy a track-type job in order to work several of the fields on his farm.

But this summer his big "cat" was laid up for repairs for a number of months, and Kesterke didn't even miss it. A medium-sized wheel tractor did all the work, and without too much strain.

The story is not that they are making so much more powerful tractors now, but that between the time he had to buy the crawler and now he has *changed his system of farming to go around rather than up and down the hills.*

During the last 5 years he has put over 20 acres of his sloping orchards on the contour, and his

tractor pulls the plow or sprayer on a level plane rather than uphill. This feature, however, is a byproduct of his endeavor to hold his soil in place and keep his farm in good productive capacity.

Before buying the farm, he had owned a farm near Hinchman that was as flat and level as a pool table and he didn't know what it was to lose some of his topsoil every time it rained. When he bought the new farm, he continued such practices as cultivating between rains to break the soil crust and setting out fruit in square fields. Before long, he noticed that with each rain little gullies were washed in the soil, and cultivating the soil smooth again didn't prevent deeper washing the next time.

"I didn't know what I could do," he said, "but something had to be done or I was going to lose the whole farm downhill."

When a Soil Conservation Service technician laid out contour lines for planting the first contour orchard on Kesterke's place in 1944 the lack of straight rows was too much for the hired man. He suggested Kesterke should work that field until the trees grew up because he didn't think he could follow the meandering rows.

Kesterke had the lines laid out this fall for his fifth contoured orchard, and all but one small peach orchard is now on the contour in the hilly

NOTE.—The author is farm editor of *The News Palladium*, Benton Harbor, Mich.



Kesterke indicates direction of travel in his 3-year-old contoured peach orchard. Note buffer strip in tree row and how well the cover crop is holding the topsoil.

portions of his farm. The remaining square-planted orchard will come out as soon as its best productive years are over and will be replaced on the contour.

At one place where the lay of the land logically called for orchard contours to extend some distance out into a pasture, Kesterke pulled up the fence, extended the orchard into the pasture, and put a new fence "on the contour" around where the orchard jutted into the pasture.

"I'd found you don't have to have square fields and I felt the cows could find their way around the fence all right," he said.

Along with contouring, Kesterke also adopted other soil-saving and soil-building practices, such as cover and green-manure crops, and permanent sod cover in apples.

Despite his 14 years' use of the farm, it is in much better shape today than when he bought it, and he's getting bigger yields now than he did 14 years ago.

Kesterke this year was named one of the three best soil conservation farmers in Berrien County for the Goodyear soil conservation contest.

BUDDIES HELP EACH OTHER.—After classroom discussions and several field tours to inspect conservation practices on ranches in the Spanish Peaks Soil Conservation District, war veterans in the agricultural training class at Trinidad (Colo.) Junior College have decided to take action on their own ranches.

The veterans have decided to pool their tractors, trucks,



pick-ups, and other equipment, and take turn about in doing on each ranch operated by a member of the class what seems most essential in getting a soil and water conservation program started. Numbers were drawn to determine the order of work on the several ranches, and conservation plans have been worked out with the aid of technicians assigned to assist the district.

Members of the agricultural class on which this cooperative conservation project will be carried are Oscar Barron, Stanley Barron, Jr., John Blasi, Louis Blasi, John Clark, Joe E. Garcia, George Hainlen, Herbert Hainlen, William McDonald, Jim Oberosler, Frank Peabody, Warren Taylor, Harold Thompson, Lester Turner, and Lloyd T. Winger, Jr.

Wives of the veterans have worked out plans whereby they will cooperate by serving lunches on the ranch where the conservation work is being done. This is expected to give a festive atmosphere to the occasions, as did the old-time logrollings and corn-husking bees.

SOUTHERN RHODESIA WELCOMES OUR EXPERTS

By E. GUILLAN HOPPER

IF THERE is one part of the British Empire anxious to obtain the advice and assistance of the United States it is Southern Rhodesia. Many of our problems are similar to yours and we are young enough and sufficiently energetic to appreciate the many virtues of American methods of dealing with erosion.

In the past we have enjoyed visits from many eminent American agriculturists, including A. T. Semple, who headed the United States Economic Mission during the war, and Dr. Walter Clay Lowdermilk. We have also benefited greatly from the advice of Dr. Hugh Bennett, Chief of the United States Soil Conservation Service, who, although he was unable to visit us during his South African tour, has passed on to us the results of his experience.

We especially appreciated these visits because we know that we can expect from our guests their candid opinions. There will be no glossing over our shortcomings and if any feature of our work does draw forth praise then it will be well-merited praise and not mere politeness.

We have learned that our country is roughly the size of California but is blessed with a heavier rainfall. Our white population is less than 125,000, whereas that of California is in the region of

Note.—The author is publicity officer, Natural Resources Board, P. O. Box 70, Causeway, Salisbury, Southern Rhodesia.



E. Guillan Hopper.

10,000,000. We have some 2,000,000 Negroes.

There is also some relation between Southern Rhodesia of today and the Southern States of the America of 50 years ago. For one thing, our main crop is tobacco whereas that of the South was cotton. We have an abundance of labor which was described by one of our American guests as "low-priced but costly." A similar state of affairs existed in the South. Again most of our tobacco plantations are big. Estates of 6,000 and 7,000 acres are by no means unusual.

Monoculture, low-priced labor, and broad acres are all dangers regarding which our American friends have warned us. Already our leading agriculturists are pressing for the wider adoption of mixed farming methods and the reduction of farm areas.



Southern Rhodesia is threatened by low-priced but costly labor and by monoculture. This native boy is handling tobacco strung on sticks ready for curing in the barns.



Public demonstrations are well attended in Southern Rhodesia.

As regards the Negro, there is an increasingly evident trend towards mechanization in farming, and at the same time efforts are being made to train the native African for industrial work which will tend to raise his purchasing power and so lessen the burden on the whites.

This mechanization of Southern Rhodesia's agriculture will, when currency conditions return to normal, prove of great importance to United States machinery manufacturers. Our experience has shown us that, taking the broad view, American equipment is better suited to our conditions than are the products of factories in Britain. Our territory is like the United States, big, tough, and rough, and if it is to prove economically useful a machine has to be made to stand the gaff.

In recent years we have purchased a great number of American tractors, ditchers, scrapers, and every other kind of giant tool for handling the soil and its products. A slender stream of this equipment is trickling across our frontiers but it is not enough for our immediate needs and we have been forced to make do with British-made substitutes.

Apart from the question of machinery, our methods of tackling soil conservation problems are similar to those employed in America. We have, for instance, divided our small country into roughly 70 intensive conservation areas which correspond to your 2,000 conservation districts. Our young conservation officers possess qualifications which compare very favorably with those of the men of the United States Soil Conservation Service and the standard is being steadily raised.

Like you in America, we have found it necessary to support the actual work of conservation with



Conditions are rough and tough in Southern Rhodesia. Machines must be able to stand the gaff.

constant publicity. In this we have adopted what are recognized to be American methods. The mediums employed include radio, press, screen, public demonstrations, booklets, and both newspaper and poster advertising. Every section of the public falls into the target area—whites and Negroes of both sexes and all ages.

Acting on the belief that the schoolboy of today is the farmer of tomorrow, we have produced for him a special series of broadcasts which he listens to during school hours and at the same time has the major points illustrated by means of film strips. Cine-films showing all sides of agricultural life in the Colony are being made and exhibited to young and old all over the country and gradually we are building up a new generation which regards the conservation of our soil and water resources as normal farming operations.

(Continued on page 180)



Between flights Alvin Clements talks to a group of Future Farmers about soil texture. In one of the hangars at the Medford airport, Clements kept running continuously a movie which told the story of proper land use.

FUTURE FARMERS MAKE AIR SURVEY

By TOM DANIEL

ONE hundred fifty Future Farmers of America were surprised at the amount of erosion in Grant County—one of the richest agricultural counties in Oklahoma—when they flew in the world's first FFA aerial soil-erosion survey held at the Medford airport last fall.

The tour, sponsored by the Grant County civic organizations, began early in the morning, at which time 30 flying farmers lined up their planes and loaded them with FFA members from the communities of Medford, Wakita, Lamont, and Deer Creek. They spent 30 minutes over the area getting a bird's-eye view of good and bad land, and then over their home farms. The venture was

designed to provide a better understanding of the need for more extensive soil conservation practices.

Since the airplanes were one- and three-place crafts, each made several trips. Future Farmers awaiting their turns to fly and those who had completed the tour were instructed in the value of land conservation and utilization by Alvin Clements, area soil conservationist.

Clements remarked: "These young men are getting an opportunity to compare their home farms with other farms in the area. A more complete picture of a farm can be obtained from the air than from the ground."

Melvin Hull, 17-year-old Wakita youth, after completing the tour, said: "I am more determined than ever to do something about the soil erosion problem."

A 15-year-old Lamont Future Farmer, Kenneth Webster, after having his 30 minutes in the air, said he did not realize the amount of damage that erosion was doing to the land. "I saw deep ditches and wash-outs that I did not notice from the ground."

NOTE.—The author is executive secretary, Oklahoma Future Farmers of America, Stillwater, Okla.

In one of the hangars a movie illustrating good soil conservation practices ran continually.

At noon, long lines of FFA members, pilots, parents of the youths, and those who came to witness the venture ate barbecue which was donated by the county civic organizations and served by Medford Future Homemaking girls.

After the barbecue, the group moved from the airport to a Medford theater for the afternoon program, which consisted of addresses on soil conservation by "T-Bone" McDonald, assistant State soil conservationist, and Clements.

In keeping with the aerial aspect of the day, McDonald was flown from Chickasha to Medford and then back to Chickasha so that he could attend a soil conservation meeting there in the evening.

The program committee consisted of Clements and four vocational agriculture teachers as follows: Cleo Dupy, Lamont; Merle Chapman, Wakita; Aubrey McNally, Medford; and Clarence Bannon, Deer Creek.

SOUTHERN RHODESIA

(Continued from page 178)

For the native African farmer we produce a trilingual agricultural newspaper from which the Negro learns the value of crop rotation, terracing, irrigation, and all the other factors that add up to good husbandry. Thirty thousand copies of this newspaper are distributed every 2 months and each copy passes through more than 12 pairs of hands.

Next year we celebrate Southern Rhodesia's "Diamond Jubilee" and we are marking the occasion by adopting yet another old American custom, Arbor Day, but we are calling it Conservation Day. On this day our young folk will be encouraged to plant trees, they will attend agricultural demonstrations, film shows, and lectures. Some of them will be taken out onto the farms where they will be the guests of the farmers and shown around tobacco estates, dairy farms, tea gardens, and cotton plantations.

We have many ancient links with the United States. One of them was forged by our founder, Cecil John Rhodes, when he established the famous Rhodes Scholarships. Another is the fact that in the original pioneer column which first hacked its way into the heart of our country there were at least a couple of American citizens!

The full development of our agricultural resources, however, is largely dependent on the

development of various hydroelectric and transport projects. At the moment these schemes involve capital investment of a magnitude that cannot possibly be shouldered by a population as small as ours.

SEQUEL TO A FACE LIFTING

IN ONE year installation of a complete conservation farm plan increased the value of Mrs. Nellie Thrasher's 175-acre dairy farm near Frederick, Md., from \$13,625 to \$26,400. The Frederick County Pomona Grange sponsored the historic Thrasher farm face lifting August 18, 1948. The same two appraisers, fully experienced in Maryland land values, made the appraisals, and what they found has been affirmed by others.

Entirely separate from this appraisal, a disinterested committee of three farm-crop experts made its annual check of the farm's production and presented a report, confirmed by two county agents and an independent farm manager, which cites "little less than miraculous results."

After noting that from 1943 through 1947, the farmer had annually bought from 2 carloads to 36 tons of hay, they observed that no such purchases were necessary in 1949. Here is an index to the reason for this—

Fifteen acres of alfalfa, in excellent condition, that will produce a third cutting, yielding one-half ton per acre.

Ten acres of mixed grasses, in excellent condition, that will yield a second cutting; estimated yield one-half ton per acre.

Twenty acres of permanent bluegrass and white-clover pasture; completely sparse in 1948, but in excellent condition in 1949 with a carrying capacity 10 times as great as it was in 1948.

Fifty-nine acres of rotational pasture with excellent coverage of orchardgrass, alsike, Ladino clover and Korean lespedeza. This area is a hillside leading to mountain. A year ago it contained very acute erosion with definite gullies and was completely bare except for a very small growth of lespedeza.

The committee also found these crop comparisons for the 2 years—

Hay: baled—36 tons and 345 pounds; loose—50 tons; more to be cut at time of inspection.

Wheat: 18 acres, 26.4 bushels per acre; 18 bushels per acre in previous years, except 1948 when crop was complete failure.

Corn: 18 acres in excellent condition promising very good yield; 40 bushels per acre in 1948.

Oats: 12 acres, 40 bushels per acre, materially affected by weather.

Barley: 6 acres, 20 bushels per acre; 16 $\frac{2}{3}$ bushels per acre in 1948.

Milk: Reduction of about 12 $\frac{1}{2}$ percent in cash return, approximately the same reduction as in the number of milking cows. Substantial reduction in price of milk has been offset by increased production per cow and improved market rating resulting from new barn.

The report of this crop committee's findings is supported by letters to the Thrasher farm advisory committee by two county agricultural agents and the manager of a large private farm.

H. R. Shoemaker, Frederick County, Md., county agricultural agent, wrote: "I was surprised at the abundance and quality of the pasture. The improvement in yield and quality since a year earlier is little less than miraculous."

Warren C. Myers, Howard County, Md., county agricultural agent, wrote: "In general, crops such as corn, hay, and small grains were above the average for farms in this particular area. Much of the improvement can be attributed to planting

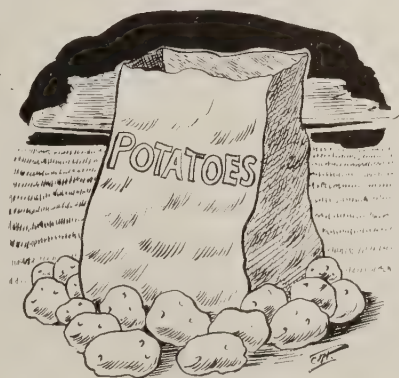
on the contour, which aided materially in reducing the loss of water and soil. People who are familiar with this farm and to whom I have talked, agree that soil conservation practices have done much to improve quality and quantity of crops on this farm."

W. R. Powel, manager, Doughoregan Manor Farms, Ellicott City, Md., wrote: "Crops seemed to be doing particularly well. Corn compared favorably with what I had seen on better farms in Frederick County. Although barns were bulging with hay, alfalfa strips were coming back strongly to make a new cutting. Hay-type and permanent pastures were in fine shape. The previously badly eroded hillside, seeded to pasture a year ago, was producing a remarkable amount of forage. I was very much impressed by the condition of the place as a whole."

Editorially, the Baltimore Sun commented: "The important permanent factor in the Thrasher farm project is neither the increased valuation nor the total of this year's crops. It is that, through the introduction of conservation measures, the topsoil which used to be washed away in heavy rains now is being held in place. That is important not only to Mrs. Thrasher but to everybody. It means the preservation and improvement of arable land that is essential to producing food for the Nation's growing population. It means also less good soil being washed downstream to clog our rivers and bays with silt, impede navigation, and kill marine life."

POTATO PROFITS.—Last year's yields of white potatoes gave Marvin Beakley, Blackwood, Camden County, N. J., grower, all the evidence he needed to prove that contour farming pays.

On one farm he planted half the acreage on contour and half in rows running up and down the hill. Both were irrigated. His contoured acreage yielded several more bags per row and better potatoes than he got off the "up and down" rows.



On another farm, where he planted on the contour and irrigated, he got his best yields. Irrigation water came from the new farm pond which is part of his complete conservation farm plan. The pond, with 2 acres of surface, was emptied before the irrigation job was done—1949 was a mighty dry year in Jersey—but 80 percent of the yield graded No. 1.

Beakley is the leading potato grower in Camden County, where 30 percent of the crop was irrigated this year.

THEY LIKED THE SAMPLE.—Soil conservation field days take a lot of time but it isn't all wasted, at least not in the case of the one held last September by the Story County Soil Conservation District on the Tom Kirby farm northeast of Ames, Iowa. Among the contractors who assisted with the earth-moving work was Leonard Stacker. Within a few days after the field day, Stacker received more than a dozen requests for earth-moving work from farmers carrying out soil conservation farm plans.

THE AUSTRALIANS USE AN "ABSORPTION BANK"

By WILLIAM A. ALBRECHT



Natives are taught terracing and 11 other accepted practices.

THE WORD "bank" is the Australian equivalent of our terrace. Soils in Australia erode seriously during the few "wet" months of the year, after which they must suffer in a different way during the many dry months that follow. The terrace, therefore, serves both as a water-holder for the dry season and as a water-remover when there is excess rainfall. However, this "holding of water" is practiced usually on the uncultivated area above the area which is eroding severely because it is under cultivation.

Since forests once prevailed extensively over much of the areas needing attention to combat erosion now, extensive areas are still in forests on the steeper slopes above those needing to be terraced. As a consequence, the Australian soil conservators are using what they call an "absorption bank" along the lower edge of the forest, and just above the cultivated terraced area. This "bank" is an enlarged terrace. However, it is built on the level. It is of sufficient height to make it the equivalent of a dam in front of a long, narrow pond on the upper part of the slope. This "bank"

is designed to overflow at one end onto a grassed waterway during high rainfall. But the volume of water which it holds is intended to carry over into the period of low rainfall while it is seeping slowly down the hillside within the soil and serving as partial equivalent of subsoil irrigation for the lower part of the slope. At the other end of the bank there may be built an extra pond in order to store still more water for other services during the drought period. This pond also may overflow onto the grassed waterway.

While these "absorption banks" are thrown up to what seems to us rather high, the terraces in the fields are generally not built up to any significant degree. They are usually made with a plow. Their upper sides are relatively steep. With the extensive areas of the country in grass for sheep pasture, naturally this lower limit in amount of disturbed sod means no serious reduction in grazing areas. Also, when the returns on the land are no higher, the investment in terraces is not going to be pushed up to a big figure by moving much earth and using costly, special machinery. If it should be planned for that by the "soil conservators," as their technical leaders are

Note.—The author is chairman, department of soils, University of Missouri, Columbia, Mo.



"Contour banks" are no unusual sight in the hilly grasslands of New South Wales. Photo by L. G. Koleski, Soil Conservation, Sydney, Australia.



Grassed waterways are used to fill ponds during the wet season to provide water for the long dry one which follows. Photo by Koleski.

called, there would be all too few graziers going into action on their soil conservation program.

But with men like W. G. Wells and his colleagues in the Department of Agriculture of Queensland, and L. G. Koleski, Mr. Clayton, and all the others in New South Wales, and "Bob" Herriott in South Australia, all talking about soil conservation, there is so much of an action pro-

gram that a visitor going to Australia and given an introduction with the word "soil" connected with his name immediately gets the comment, "Oh, you are connected with soil conservation? You came to a country where we need all the help that you can give us."

The absorption bank is not a diversion ditch at the top of the slope, but, in fact, is a contour dam



The landscapes tell us that soil conservation is in action with absorption banks (A and A₁) above the upper edge of the steeper slopes and plowed terraces (B and B₁) leading into the grassed waterways (C and C₁) at the Gunnedah Research Station. Photo by Koleski.

on the lower side of an elongated pond. It is not unusual for it to be a slender pond along the lower edge of an uncultivated slope which might have a grade as severe as 30 percent. It is usually overgrown as quickly as possible by seeding it to the tall-growing, heavy-rooting Rhodesgrass. It is the first step in trying to keep an area below it as free as possible from any running water coming from the slope above it. It is an attempt to hold the troubles on arable or pasture areas down to those wholly their own by excluding any that might come from above it. Then, in addition, it is a help in having some soil water carry over into the dry period when no one would fight against but everybody would fight for some extra water.

Soil conservation in Australia is still a young program. It is not settled to a single or well-defined philosophy. Since the separate States have long been given to pronounced independence of each other in many aspects, it would be very unusual if they should all be following one uniform policy in soil conservation so early in their work of protecting the soil resource. They are, nevertheless, studying their broader problems seriously. The necessity of conserving water as well as soil compels this. They are expecting one of their leaders, Robert Herriott, to make a visit to the United States in 1950 to learn what he can about the conservation techniques here. He will also be studying the interests of 4-H Clubs, and the activ-

ities in agricultural extension, as all these can make soil conservation more widely appreciated and used in building the soil for a securer foundation for country life. The wide areas of Australia, made up of single sheep stations dealing in hundreds of acres, if not in square miles, tell us that Australians think in broad terms. There is every indication that they are building their soil conservation on just such dimensions. We may well follow the reports in their literature, and exchange ideas with them, for mutual benefit.

MICHIGAN GROUPS BUILD FOR TO- MORROW

By ROBERT W. GEORGE and LINDO J.
BARTELLI

GROUP action in getting soil conservation on the land has been one of the main features of the relatively young soil conservation district in Osceola County, Mich. Farmers in this district have banded together, until now there are 37 active neighborhood groups exchanging work and ex-

NOTE.—The authors are work unit conservationist, Evart, Mich., and district conservationist, Ludington, Mich., respectively.



Typical activity during soil-saving bee.



Russell G. Hill, executive secretary of State Soil Conservation Committee, talks in field on value of working in friendly neighborhood groups.



District directors, farmers, and technicians working out plans for the Kohn farm.

periences in putting their land under good soil conservation farming.

The extent of this neighborly action and its degree of effectiveness was well shown in August by the Cedar Township group. This group, working with the district directors, the Soil Conservation Service, the Extension Service, and the State Conservation Department, staged a "Bee for Saving Soil" at the farm of Charles Kohn, a member of the Cedar Township group. A complete remodeling job was done by the group with assistance from other interested cooperators in neighboring areas.

As dawn broke over the hilly 80 acres one morning last August, Charlie's farm lay in 14 small, unevenly divided fields, more or less square. The only concession to topography and soil type was that land too wet to plow was in grass or willows. Around 9 o'clock in the morning, Charlie's neighbors began arriving with their farming tools. They came to help Charlie remodel his farm. Art

Truax brought his team and drag; Wilbur McIntyre, a tractor, field cultivator, and lime spreader; Verger Wood, a tractor and field cultivator; Earl Apsey, a tractor, plows, and field cultivator; Ferris Leach, a tractor and plow; Bob Johnson, a tractor and plow; and Kent Boyd, a tractor, plow, and disk.

This crew was reenforced by two bulldozers, a crawler tractor, and a district muck plow. Farm tractors with plows constructed terraces to divert water from hillsides into sodded waterways to carry it downhill without erosion. Other farm tractors worked upland broken by the muck plow. Another tractor with disk and field cultivator worked up new ground leveled by bulldozers for pasture. Long before sunset, when the work was done, Charlie's cropland had grown from 52 to more than 60 acres and the 14 fields had disappeared. In their place lay strips of land that followed the contour of the hills in a winding fashion, that allowed similar soil types and land of similar slope to be farmed together across the slope of the land. Idle land not suited for farming was improved to provide cover and food for wildlife. Land best suited for crop use was available for crops, and land most suitable for pasture was in pasture. More than a thousand farmers from the district observed this successful demon-



Barney Vanderveen chats with Charlie Kohn during the bee.

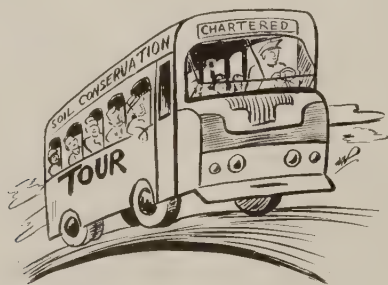
stration of soil conservation farming. The main reason for the success of this day was due to the cooperative spirit shown by Charlie's neighbors.

Since the board of directors has put a major emphasis on group planning, it wanted to show that a soil and water conservation plan developed through group action also could be effectively applied on the land through the same neighborly spirit. The board took an active part in planning the soil-saving bee. Nelson Rogers, chairman, assumed the responsibility of being general chairman of the day. Director Walter Johnson was in charge of equipment and material, Director Ferris Leach was in charge of the grounds committee, Director Barney Vanderveen explained the advantages of terracing and strip cropping at one of the main points of attraction, Director Peter Bontekoe handled the parking and refreshments, and County Agent W. S. Harrison handled the publicity.

Technical assistance in developing and establishing the soil and water conservation plan on Charlie's farm was furnished by men of the Soil Conservation Service. Personnel of the Michigan State Conservation Department furnished technical assistance in developing the woodland and wildlife phase.

The directors feel that this demonstration will show farmers in the district the way to establish soil conservation on the land through exchange of work and ideas between neighbors.

NOTES FROM THE DISTRICTS



FAMILY AFFAIR NOW.—The Green County district (Wis.) Homemaker Clubs, all 52 of them, became the first in the State to adopt soil conservation as a regular project. To back up their resolutions the homemakers made a tour to study first-hand the best examples of conservation work in the district. The leaders asked questions and made sure the group was informed about each project. Just let the folks at home try to escape hearing about soil conservation, now!

PICKED FOR PRIZES.—"Saved Acres" are the words that won the \$10 first prize offered for the best name for the 88-acre Peter Pennington Farm, Greasy Ridge Road, near Princeton, W. Va., where 4,000 witnessed a 1-day face lifting called "New Look" on August 10. Fred Rogers, an Athens, W. Va., high-school student, who plans a career in forestry, suggested the name. James C. Hurst, who came all the way from Tampa, Fla., to attend the event, won \$10 offered by a Princeton bank to the farmer traveling the greatest distance.

POWER OF PRESS.—Lloyd Prestidge, an Alvarado, Tex., farmer, gives credit to an editorial in the *Fort Worth Star-Telegram* for his conversion to conservation farming.

The editorial, written by N. A. Stedman in connection with Soils and Souls Sunday, stressed the moral responsibility involved in soil and water conservation. Soils and Souls Sunday was conceived and is sponsored annually by Farm and Ranch.

E. H. Varnell, district conservationist, says that Prestidge credits the editorial for his applying to the Dalworth Soil Conservation District for assistance in planning and carrying out a well-rounded conservation program on his farm.

HARNESSING A STREAM.—Supervisors of the Gila Valley (Ariz.) Soil Conservation District, assisted by Soil Conservation Service technicians, apparently have solved a problem which was created in January 1949 when a flood on the upper Gila River did considerable stream-bank cutting into cultivated fields in the Safford Valley. The Service did the engineering and the district furnished the tractors.

When large trees were available, a continuous log or tree chain was formed along the stream bank with each tree being tied to a cable stretched along the bank. In most instances a perfect stand of black-willow seedlings has sprouted and is growing in the silt trapped by the log chain. This winter, farmers whose land was being damaged are planting willows in areas that have not seeded naturally.

On the W. O. Tyler farm at Fort Thomas, black willows were the only trees available and there were not enough of these to build a tree or log chain. The only alternative was to build willow spiders, which are 5-foot poles wired together at right angles at each end of a 12-foot horizontal pole tied to a cable along the stream bank.

During the installation of the spiders, the river was still cutting into an alfalfa field on Tyler's farm. Therefore, in an attempt to speed up the job of protecting his field, Tyler left 20-foot gaps between the spiders with the idea of making a second round and building a continuous line of spiders along the entire 1,100-foot river boundary of the field. However, this proved to be unnecessary, since the original set-up of spiders gave the field excellent protection even at the sharp curve of the river. Approximately 75 percent of the willow poles used in the spiders have taken root and are growing. Tyler is planting additional willows in the gaps this winter so he can be sure that the river will not damage his field again even during the most severe floods.



ONE COUNTY WORKS WONDERS.—Impressive changes are taking place in Lamar County, Ga. In 1947 five farmers seeking better and cheaper grazing planted a total of 16 acres of Suiter's grass (Kentucky 31 fescue). Results were so good that the next year 39 farmers planted 456 acres of the fescue. Popularity continued to grow, and in 1949 there were 1,274 acres of fescue on 103 different farms—more than 2½ percent of the county's open crop and pasture land.

But fescue does not reflect the whole story. A partner is sericea—2,614.7 acres planted by 232 farmers. This represents 6 percent of the open crop and pasture land in Lamar County.

There are also 4,700 acres of improved, fertilized, and seeded White Dutch, Dallis, crimson, lespedeza, Bermuda permanent pasture. In this there is over 10 percent of the open crop and pasture land.

The hay and seed crop from sericea alone is valued at \$3,500—more than the cotton crop was worth.

Paul D. Schumacher is soil conservationist.

PUERTO RICO PROGRAM MOVES AHEAD.—Soil conservation is moving forward rapidly in Puerto Rico's 17 soil conservation districts. In one typical month recently, 124 farm plans, comprising 4,957 acres, were prepared by SCS technicians assisting the districts and 9,500 acres were mapped by the two SCS soil scientists. Assistance was also given farmers in laying out terraces, water-disposal areas, vegetative barriers, contour farming, and tree planting. SCS engineers assisted the Land Authority Farm at Barceloneta in draining 75 acres which will be planted to sugarcane.

District supervisors sponsored a contest in which \$500 will be awarded to district farmers and 4-H Club members having the best demonstrations of soil conservation and proper land use on their farms. The contest was made possible through cooperation of the Lions Club of Mayaguez. Supervisors of the Torrecillas, Cibuco, San Juan, Este, and Norte districts are taking an active part in construction of limestone mills in their districts. Other districts are promoting an educational program through motion pictures, displays, and tours in cooperation with the Extension Service.

Soil conservation plans are being applied on the Insular Penal Colonies at Guavate and Zarzel with the active cooperation of the Insular Justice Department, which is seeking to make of the prisoners better citizens and more efficient farmers. Night classes in soil and water conservation have been conducted for the prisoners. Motion pictures and displays also are being used in the educational program at these colonies.

WHERE WATER IS PRECIOUS.—Savings up to 50 percent in volume of water used, and similar reductions in time and labor required for irrigation, have been accomplished on many Mason Valley (Nev.) farms through conservation farm planning.

A recent study of the effects of leveling and grading some 8,000 acres of farm land and revising irrigation systems and methods on 110 farms was the basis of planning irrigation improvements. The surface slope, depth, texture, and arrangement of strata in the soil determine the proper length of fields, the width of borders, and the feasibility of leveling. The size of stream in each border and how long to apply water each time are also calculated.

On one typical field before planning, 7.3 acres-inches of water (by actual measurement) were applied at one irrigation in 80 minutes. It was found that 1.5 inches was retained in the root zone of the crop and 5.8 inches lost by deep percolation.

By dividing the field into 2 runs, 3.6 acre-inches of water were applied in 20 minutes, leaving the same amount of water (1.5 inches) retained in the root zone of the crop. This is a saving of 50 percent in water used and 75 percent saving in time required for each irrigation.

On the Antone Farias farm 209 acres have been leveled and a planned irrigation system installed. Seventy-six of the 209 acres were not previously in cultivation. Farias reports that prior to this improvement it took 2 weeks each time to irrigate the entire farm. He is now able to irrigate the entire farm in 5 days, with half as much work and half as much water as previously required.

Austin Baalam cites a 13-acre field on which he raised only 350 bales of hay in 1947. In 1948 he raised 1,008 bales on the same field. He attributes the increase to more careful irrigation, including the use of considerably less water in 1948.

A stream of 6 cubic feet per second now irrigates in 6 days the same land that required 15 days before leveling and ditch revision on the farm of E. Aiazzi in the Meissner district of Mason Valley—a saving of 60 percent in water and labor.

—SUMNER HATCH

LIONS HELP.—When Wirt County, W. Va., farmers decided that they wanted to get into the Little Kanawha Soil Conservation District, the Lions Club at Elizabeth took the initiative in sponsoring two meetings. Organization of Wirt will reduce the unorganized territory in West Virginia to two small blocks—five and a half counties in all, mostly in a mining region which has relatively little agriculture.

COTTON PRODUCTION SOARS.—William Jackson, who operates a farm about a mile southeast of Artesia, N. Mex., got three bales of cotton per acre on a 19-acre field last year largely because of soil and water conservation practices centered on land leveling and crop rotations.

Jackson is a cooperator of the Central Valley Soil Conservation District.

SEED HARVEST.—Two acres of low-lying meadowland on the farm of J. Leo Seely, of Mount Pleasant, Utah, unsuited for alfalfa or grain, have been made to produce tall wheatgrass seed worth nearly \$650.

In the fall of 1947 the Sanpete Soil Conservation District furnished Seely 8 pounds of tall wheatgrass seed. The area where Seely planted the wheatgrass in rows is extremely high in lime and is subject to spring overflow; later it becomes very dry with no irrigation water available.

Seely cut the field with a binder in September 1948 and stacked the bundles. The winter of 1948 was one of the worst on record in this part of Utah, so Seely used the bundles to feed his cattle and horses. In 1949 he found a good stand of the tall wheatgrass where the bundles had been scattered.

Last September Seely cut the 2-acre field with his binder, threshed the seed, and paid 1½ cents a pound for cleaning. He returned 16 pounds of seed to the district, and retained 100 pounds, plus the cleanings, for his own use.

Seely then sold the remaining 750 pounds of seed at 75 cents a pound for \$562.50. Figuring the 16 pounds of seed returned to the district and the 100 pounds which he kept at the same price, the total seed yield from the 2 acres was worth \$649.50, or about \$325 per acre.

FOUR MORE FOR PA.—Four more counties have been added to Pennsylvania's soil conservation district total. Columbia, Erie, and Lebanon are the newcomers. Wyoming came in earlier in the year, and Westmoreland has been declared but is not yet organized.

IT PAYS TO FARM AROUND THE HILL.—Soil conservation is mighty profitable in Benton County, Iowa.

Walter Boehmke of Belle Plaine has received \$200 per acre during the past summer from his alfalfa-brome hog pasture. Dick Schild, who practically grew up farming around the hill, consistently wins the corn-yield contest sponsored by the Belle Plaine Chamber of Commerce. His yield last year was 136 bushels per acre. Harry Carr of Shellsburg estimated that his terraced field would yield more corn per acre than he had ever grown before. His oats yield was 80 bushels per acre. Daniel Bruch told the district commissioners that he hasn't lost a ton of soil from his terraced field in the last 2 years. Howard Knupp's story about the results he got from hogs feeding on Ladino clover would be hard to believe had not both soils men and neighbors watched the progress during the summer. Among soil conservation pioneers in Benton County are Wendell Merchant, whose father farmed around the hill 20 years ago, and Bill Eldridge, who farmed on the contour 23 years ago.

FERTILIZER TRIAL.—Harold and Jack Miller of the Lucas County (Iowa) Soil Conservation District got some interesting results with fertilizer applied to corn on old brome sod last year. The Millers plowed an old

stand of brome in the fall of 1948. Since the sod was heavy they applied 200 pounds of ammonium nitrate per acre, broadcast in the spring of 1949 when the seedbed was being prepared.

They also applied 150 pounds per acre of 2-12-6 fertilizer in the row with a planter attachment. To find out how the fertilizer affected the corn yield, Jack left some rows that received no fertilizer, some that received only 2-12-6, and some that got only the ammonium nitrate. Markers in the fence line made identification positive.

The Millers asked the Soil Conservation Service men assisting the district to help determine the yields. The corn was picked by hand from a measured length of row and the weights converted to bushels per acre.

The corn without fertilizer produced 87 bushels per acre. The rows that got only 2-12-6 produced 95 bushels per acre. The corn that received only the ammonium nitrate made 99 bushels per acre, while both fertilizers boosted the yield to 105. Figuring the increase at \$1 per bushel, all treatments were profitable. This is a case of profitable application of fertilizer where the fertility was already so high that no difference in the rows was apparent during the summer.

THE NEEDED ELEMENT.—Trace mineral enthusiasts will be interested in the experience of Milford Richman, farm planner in the Noble County (Ind.) Soil Conservation District. In October 1949 R. L. Reynolds showed Richman a lush meadow of Ladino grass. "When that field was in corn 2 years ago," said Reynolds, "we actually didn't get enough corn to cover the bottom of our crib. We have been here 3 years and never have grown a decent meadow before."

The story of Reynolds' fine meadow goes back to August when Richman suggested adding 20 pounds of borax to the 0-15-15 fertilizer Reynolds was using on part of his meadow, and 20 pounds of borax only, on another part. Now there did not appear to be any difference between the clover where the fertilizer and borax were used and where the borax was used by itself. The borax was responsible for the new luxurious growth.

Reynolds will have the kind of pasture he has long wanted for his herd of Guernsey cattle.

SEEING IS BELIEVING.—Jim Stevenson, work unit conservationist, of Baraboo, Wis., conducted a working-with-terraces clinic at the Sauk County soil conservation field day that should have wide application. Jim roped off a 200- by 200-foot area that included two terrace ridges. Using a loud-speaker, he first explained the use of terraces, how they are constructed, and some of the problems that come up in farming terraces.

Then a tractor and plow were brought into the enclosure and enough short rounds were made to demonstrate how a terrace is maintained in plowing. Next a drill, planter, and a grain binder were brought in and operated on the terraces. A mower was used to cut the grass on the unplowed terrace and this was followed by a side-delivery rake.

DISTRICTS TELL THEIR STORIES.—Ten Michigan soil conservation districts—Allegan, Van Buren, Galien River, Lenawee, Wexford, St. Joe River, East Allegan, Missaukee, Osceola, and Mason—are conducting regular district board radio broadcasts. In the Wexford district the director interviews business and professional men. A minister, an insurance man, and a housewife took part in a recent program.

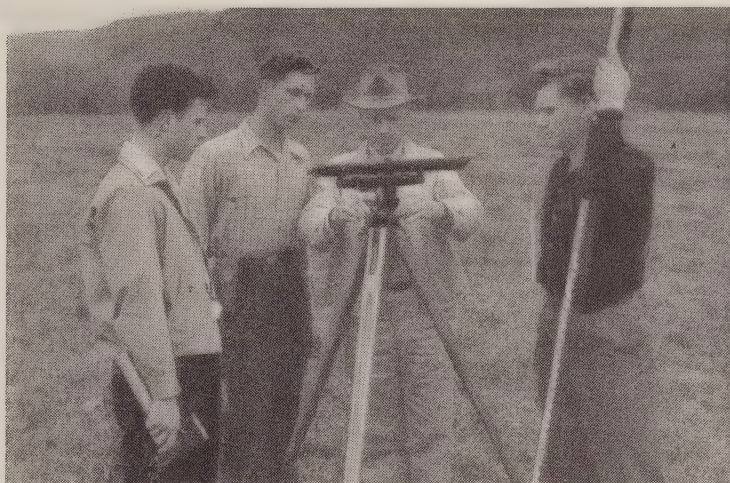
CONTEST IDEA.—The Manistee County (Mich.) Soil Conservation District is sponsoring a slogan contest for local high-school students. The district supplies each school with a set of sixteen 8- by 12-inch signs, painted and ready for lettering. The idea is to rig them up for roadside use, "Burma shave" style. The contest puts a premium on originality, quality of work, and aptness of thought. Prizes will be spruce trees for the school lawn.

MAKES BETTER NEIGHBORS.—In Joe Sena's 30-acre potato field, Worthington, Mass., rain water would come down over the field in such quantities that the pipe in the culvert, under the road at the foot of the slope, had to be increased from 4 to 18 inches. Even then, the runoff would top the road during heavy storms. Much topsoil was deposited on the road and on the lawn of a neighbor. Diver-sion terraces and strip cropping now, however, establish so tight a control of the water that the amount of runoff during any storm this past year would not have filled the original 4-inch pipe. Soil no longer washes onto the road-way and the lawn of Joe's neighbor. "This makes us better neighbors," he says.

LONG ROWS, PLUS.—When Frank Harris, of Shiloh, N. J., and SCS technicians working with the South Jersey Soil Conservation District came together for the planning of his farm, the first thing he asked for was long rows for his potatoes. "Make them as long as you can, and if you clear up that half-acre low spot so I can plant more pota-toes there I'll be sold on the soil conservation program," he said.

The technicians delivered exactly what he wanted. With his own farm equipment and labor he built 1,800 feet of diversion terrace in the upper third of his field and fol-lowed its contoured lines in planting his crop. The yield was big and the wet spot disappeared, and he had 80- to 90-percent erosion control.

In 1949 he came back with a request for more terraces so he could plant asparagus on 33 acres. This time he wanted more than "long rows"—he wanted three terraces in a field that had very little slope, and all the controls that he could get. He planted 8 acres of asparagus to conform with the contour of two established terraces and put the other 25 acres into beets planted to the same pat-tern. In two or three more years he will learn what bene-fits controls bring to asparagus fields. By that time he will have 20 to 24 more acres planted to that crop. The beet yield this year was very good, but best of all, he had no erosion in asparagus and beets. A neighbor's field, much like Harris' but not farmed the conservation way, took a licking from washing.



Survey instruction; Donald Wilder, William Funk, Prof. Eddy Foster (at instrument), and David Sherwood. Photo by courtesy N. Y. State Agricultural and Technical Institute.

ON-THE-GROUND INSTRUCTION.—An invitation to an SCS district conservationist to assist a technical institute professor in 1944 classroom work on conservation has re-sulted in the development of a full-fledged 2-year conserva-tion course in which 35 students are enrolled. The first year there were only two.

E. E. Foster is the teacher who had the idea at the State Agricultural and Technical Institute at Alfred, N. Y.; and Robert A. Reed, in charge of SCS operations in Allegany and Steuben (N. Y.) districts, is the district conserva-tionist who helped. Together, they developed the basic teaching outlines in soil conservation and forestry from material both had been gathering.

Of the original two students, one is an SCS employee. Another worked for SCS last summer and two more were employed by the Allegany County district. Others are looking ahead to years of professional service in conserva-tion work. Most of the students have come from farms in New York's southern tier. Outstanding progress made in applying soil and water conservation and good land-use practices in that area is one of the results of the in-stitute.

In addition to field studies of conservation measures already applied to the land, the students get on-the-ground instruction and experience in farm planning and lay-out and operations. In studying farm needs as revealed by conservation surveys, they work out designs for struc-tures and apply agronomic, forestry, and biologic recom-mendations. Classroom work includes a series of lectures by Reed and experts whom he invites as guest speakers.

3-HYDRANT POND.—After Howard Gilmore, orchard-ist of Westboro, Mass., had built a dugout pond so neigh-borhood boys would have a place to play hockey, he got some more ideas and through use of his orchard bulldozer expanded it into a 3-acre spring-fed pond planted with fish. From the pond he then laid 3,000 feet of transit pipe to supply three fire hydrants for the protection of three separate homes. The road is 50 feet below the pond and there is a hill between them. When he could not get an easement and go around the hill on a neighbor's land, he took the pipe right over the hill and made a siphon out of the system. It works perfectly.

GETTING A HEAD START.—The supervisors of the Elkhart (Ind.) Soil Conservation District have organized a Soil Conservation Achievement Club to get farmers to carry out simple soil conservation practices until the farm planner can assist them. A printed leaflet announces the purpose of the club and lists 10 practices that can be undertaken while working toward a complete farm conservation plan. The 10 practices: Sow cover crops, sod waterways, mow stubble clover after harvest, seed adapted legume-grasses, sow Balbo rye for spring pasture, drill grain on the contour, renovate pastures, set aside wildlife land, plant windbreaks, register woodland under State forestry law.



WOODS WORTH CONSERVING.—As a home-hobby project for off-duty hours, Jesse McCartney, a foreman of building maintenance and construction for the Soil Conservation Service, Fort Worth, Tex., built an inlaid coffee table consisting of 5,555 separate pieces of 21 different kinds of wood from 5 States and 5 foreign countries. Nights and week ends over a 6-month period, and a lot of patience, were required. It has an intricate design that works out from a Texas star in the center. A musical-note motif is carried out in the leg pattern.

In the table are sugar pine, ponderosa pine, birch, maple, ebony, two kinds of mahogany, three kinds of oak, rosewood, cherry, walnut, cedar, spruce, poplar, mesquite, red and black gum, redwood and teak. Any why all this work? For a gift to the wife, of course.

PASTURES RESPOND TO GOOD SOIL.—In March 1949, Frank Smart, cooperator with the Checotah (Okla.) Soil Conservation District, started spring-sodding 110 acres of land he had taken out of cultivation.

Frank decided that he could save his soil and at the same time increase income by establishing pasture.

These 110 acres of Bermuda-grass have been cultivated once and have been fertilized with 20 percent super-phosphate.

By the last of June, 40 head of whiteface cattle were grazing on this pasture. This is a record in the Checotah



Frank Smart, at right of driver, finds it easy to drop Bermuda-grass roots through pipe; they drop between the discs.



THEY CATCH THE EYE.—Supervisors of the Central Valley Soil Conservation District, with headquarters at Artesia, N. Mex., are proud of the soil and water conservation work being done by farmers in the area. They have had two large signs erected on farms where good soil conservation practices can be observed from the highway. The signs are located on highway No. 285, one north and the other south of Artesia. One of them shows in the picture above.

NATIVE GRASSES ARE GOOD BUSINESS.—Businessmen of Hamilton, Tex., are helping farmers and ranchers of the Hamilton-Coryell Soil Conservation District get native grasses seeded.

In 1949 the Hamilton Chamber of Commerce granted \$150 worth of grass seed to farmers who would sell all the seed they harvested, above what was needed for their own use, to other farmers and ranchers in the district.

A program to encourage the saving of likely seed plots for harvesting is paying dividends, too. Over 1,000 pounds of seed of Indian and bluestem grasses were harvested in November on the Lusk Randals and Mont Young farms.

Surveys show that there are 48,000 acres of land in the western section of the district which should be re-seeded to native grasses.

This year Texas had its first big grass-seed harvest since 1941. More than 300,000 pounds of native grass seed were harvested in the Bowie, Jacksboro, and Henrietta areas, with the biggest amount coming from around Henrietta in Clay County.

district for establishing a Bermuda-grass pasture. In the fall this pasture was overseeded to yellow hop and Ladino clover, and next spring it will be overseeded with Korean lespedeza. The 100 acres is expected to carry 220 head of cattle after the lespedeza and clover are established.

The tractor-planter planted 15 acres per day. The rear wheels were reversed and set to run over the roots that were covered by the disk in front of the rear wheels. This pressure brought the soil particles in close contact with the root system, and is one reason for growth starting so readily. The planter has been used on several other fields with equally good results.

For the past several years row crops had been grown on the soil where the Bermuda-grass pasture was established. Smart wanted to get his Bermuda pasture before he had lost most of his soil. That is another reason why the Bermuda-grass has done so well: Smart did not wait until he had lost all of his topsoil to establish his pasture. Fertile soil will produce pasture grasses more readily than soil that is sterile.

"I didn't want to try to establish a pasture in subsoil," said Smart. "If I had farmed this land 2 or 3 years more I would have been twice as long, or longer, in getting my pasture established. It is cheaper to establish a pasture where you can get good coverage established the first year. I figure I'm well on the way to a good pasture and more profit from the land I'm putting in pasture than if I were still trying to row-crop it.

"I would much rather try to establish a pasture on class III land than to try to establish a pasture on class V or VI land. It is cheaper and you will have a better pasture."

Good soil preparation is essential. These 110 acres were flat-broken, disked, and harrowed. There was no vegetation to compete with the growing Bermuda. The one cultivation given the Bermuda and good soil preparation eliminated other grasses and weeds.

Frank Smart has 30 acres in cropland this year that will be established in Bermuda-grass in the spring of '50. This will put his entire 310 acres in grass. A blue-stem meadow of 50 acres is included.

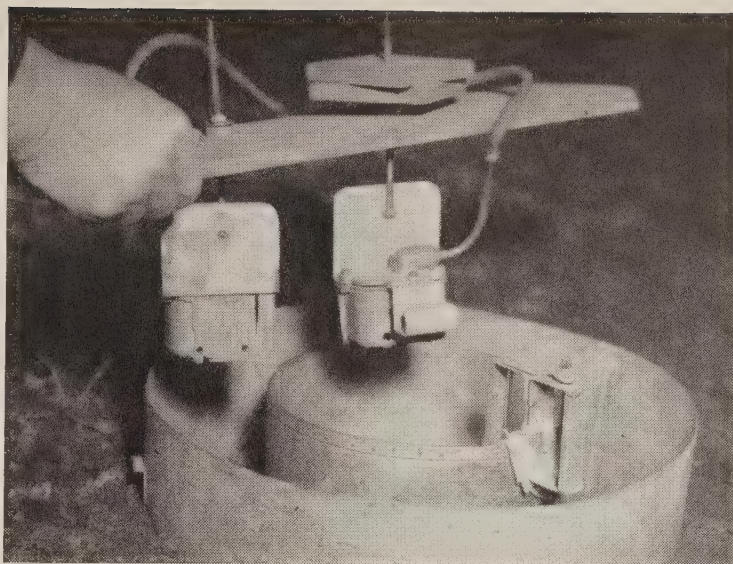
Many farmers in the Checotah district are becoming grassland farmers. They are the only farmers during the past 6 years of heavy rains in the region who have not worried when the rains came. Their land is anchored and there are no soil losses.

—DAVID H. MARKHAM

HOW FAST DOES A SOIL DRINK?—Not long ago a farmer in northwestern Oklahoma dropped in at the Soil Conservation Service headquarters at Woodward, Okla., with a problem for A. D. Bull, a technician assigned to the area.

The farmer explained that one of his irrigated fields had stopped producing. He had tried sweetclover to improve the soil, but it hadn't done any better than other recent crops, although he had irrigated well.

Bull put on his hat and picked up an odd-looking contraption from the table. He suspected the trouble but he had to make sure. This home-made arrangement of tin and clockworks would help him find out.



He had fashioned the gadget himself—an infiltrometer designed to measure the rate at which soil can absorb water. The rate at which soil can take water is called its permeability, the ease or slowness with which water or air can go in and out.

Bull's test revealed the trouble. It showed the percolation rate on the farmer's land to be 0.26 inch per hour. Nearby land which had not been cropped was tested too. It took water at the rate of 5 inches per hour.

Investigation showed "plow pan" to be the cause. It was the result of year-after-year plowing at the same depth. The plow pan averaged about 7 inches thick. Water was hitting the hardpan and spreading out. So were the roots of the sweetclover.

The farmer broke up the plow pan with chisel equipment. This allowed the roots to go on down and, by watering at the right times, the farmer was able to turn under a good growth the following spring.

To build the infiltrometer, Bull had gathered odds and ends, including an orange juice can, carburetor floats, an alarm clock, a sardine-can key, a welding rod, and a couple of metal drums. The tin can was fixed on the rod and this was attached to the minute hand shaft of the clock. This became the recording element and was mounted on a drum which was to hold a certain amount of water.

The drum of the recording element was connected by rubber tubing to two sets of floats made of corks and carburetor floats and located in two metal rings placed on the ground. These rings were leveled and 2 inches of water was poured in. As the water in these rings soaked into the ground the floats allowed the water in the tank of the recorder to flow down and keep the center ring at the same level.

The outside ring of water serves only to keep the water of the inside ring going down into the ground instead of sideways.

The recording drum is turned by the clock. A float in the recorder drum causes the recording needle to go down as the water recedes.

Development of the infiltrometer by Bull will be an aid to agriculture. The older method of testing for percolation required constant supervision for hours. Bull's instrument makes a record.



NATIONAL 4-H CHAMPS.—The eight national 4-H Club winners in soil conservation were honored at the twenty-eighth National 4-H Club Congress in Chicago. Each was the recipient of a \$300 college scholarship offered by the Firestone Tire & Rubber Co.

In the photograph they are looking at old-fashioned washboards used to illustrate the difference in speed of water runoff between horizontal and up-and-down furrows. In the center, with the pitcher, is Miss Jacquie Mercer, who was Miss America of 1949.

Left to right: William A. Runsick, Tuckerman, Ark.; Lloyd Bradley, Tallevast, Fla.; Harold Beigert, Junction City, Kans.; Paul E. Spurrier, Union Bridge, Md.; Miss Mercer; Harvey Firestone, Jr.; Neil R. McAlpin, Polson, Mont.; Donis D. Patterson, Millersburg, Ohio; and Dick Ball, Yukon, Okla. Jimmy Mohr, of Evansville, Ind., another winner, was not present for the picture making.

NEW FHA BOOKLET.—A new publication replete with suggestions, information, and eye-pleasing pictures has been issued by the Farmers Home Administration under

the title, "Planning That Pays." It is the work of Paul V. Maris, who is a consultant on the staff of Dillard B. Lasseter, Administrator.

The Farmers Home Administration, as explained in the foreword, makes use of two tools—credit and supervision. Many borrowers "have had the benefit of soil conservation plans prepared by employees of the Soil Conservation Service."

On the inside front cover of this booklet are listed what are called "The seven 'sees' of the farm ownership job": (1) See that loans are made to eligible families who need the help, who are worthy of the help, and who understand the benefits and obligations involved in teaming up with the Farmers Home Administration; (2) see that the farms selected are farms on which it is possible for a qualified family to make a satisfactory living; (3) see that the farms are put in livable and operable condition at the start; (4) see that the investment is not greater than the value of the farm from an earning capacity standpoint; (5) see that a good farming system is adopted; (6) see that good farm management, home management, and money management methods are practiced; (7) see that farms are well maintained.

April 1950



SOIL CONSERVATION
OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

SOIL CONSERVATION•

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SECRETARY OF AGRICULTURE

HUGH H. BENNETT
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WELLINGTON BRINK
Editor
Art Work by
W. HOWARD MARTIN

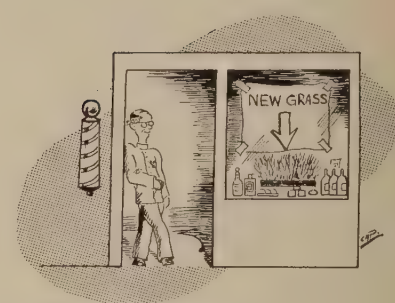
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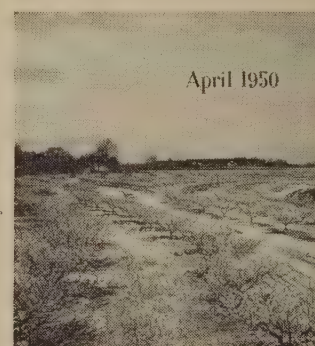
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BARBER SHOP DISPLAY.—In the Monte Mucho Soil Conservation District, a drive to acquaint southwest Texas ranchers with new grasses is attracting unusual attention.

After a full description of a grass is run in the local newspaper, a sample is placed in the window of Fred's barber shop in Hebbronville, along with other specimens. Fred is no longer just a barber—he's getting to be quite a nurseryman to boot, what with seacoast bluestem, red sagegrass, KR bluestem, crinkle-awn, and tanglehead crowding out the hair tonic placards in his window.

17,000 FEET OF TILE.—A record for installing tile drainage is being made in Maine where 17,000 feet are being laid at the C. A. Powers farm, at Fairfield. It will drain a 40-acre field. The herringbone system, laterals 60 feet apart, is being used with 500 feet of open drain, 2 to 3 feet deep, as an outlet. The record day's installation was 2,300 feet.



FRONT COVER.—Spring comes to this beautifully contoured peach orchard that belongs to Roy Brannon, Inman, S. C. It is in the Broad River Soil Conservation District.



Sprinkling is as advantageous to this vineyard set out in 1947 as to older vineyards. Soil borings show excellent penetration and utilization of water. There has been no loss of water by runoff or erosion. Evaporation losses are small.

ARTIFICIAL RAIN MAKES A VINEYARD THRIVE



The quick-coupling sections of aluminum pipe are easily moved by one man. The area covered is greater to the lee than to the windward side; allowance for this is made in the number of rows the pipe is moved at each shift.

By **HERBERT A. HOPPER** and
CARL M. FORSBERG

NOTE.—The authors are soil scientist and engineer, respectively, Soil Conservation Service, San Jose, Calif.

WATER is precious in the Santa Clara Valley of California. Maintenance of natural reserves is vital to insure a continued supply for agriculture, industry, and domestic use. The en-

tire valley depends on water pumped from underground reservoirs at depths of 80 to 600 feet. During the last three decades the depth to water has been steadily increasing.

The Santa Clara Valley Water Conservation District has attempted to offset the drain on water supplies by building a series of dams in the mountains that surround the valley. These collect excess runoff during the winter months. The water is then percolated into the deep gravel beds that underlie the valley floor.

This method of water conservation has been helpful to many parts of the valley but not to all. The Evergreen Soil Conservation District, unfortunately, is one of the areas which has not benefited, due to geographical location and geologic formations. Farmers in the Evergreen district, therefore, are gravely concerned by the lowering water table and keenly interested in any method of conserving the water presently available.

Water conservation was the big problem that faced the Evergreen Soil Conservation District when it was organized in 1943. To meet it—and it was met with considerable success—irrigation systems were revised to fit the land. Revisions consisted mainly of contour checks and furrows to fit the soil type, slope, and water supply. Sprinkler irrigation was considered. But farmers were reluctant to make the change to sprinkler methods. Some thought sprinkling increased evaporation losses. Others were afraid it would increase their insect and disease problems. Resistance to sprinkler irrigation was rather general until two brothers, E. A. Mirassou and N. C. Mirassou, proved that it was both a practical and profitable answer to the water problem.

The Mirassou brothers were the first to establish a large-scale sprinkler irrigation system in the valley. They operate 300 acres of vineyard and some 58 acres of orchard land. Soon after the brothers took over management from their father in 1942, they found irrigation necessary for the production of large quantities of quality grapes. In the central coast area of California wine grapes generally are grown without irrigation. An average rainfall of 20 inches is sufficient, but in the Evergreen district the average is only 12 inches a year.

The Mirassous planned to bring the annual available moisture up to the required 20 inches, if possible. They started irrigating with downhill

furrows, and increased their production and quality. There wasn't enough water for complete irrigation from their own system so they laid pipe lines to neighbors' wells and started buying water. This helped, but costs were high and water was hard to get. They also found the water was moving soil from the top to the bottom of the furrows and they believed they were not getting maximum benefit from the water.

Being conservationists by nature—E. A. Mirassou is a director of the district—the brothers came to sprinkler irrigation as a possible answer to their problems of erosion and water conservation. The story of their success with sprinklers lies not so much in increased production or better quality—both of which had already approached the maximum—as in lower costs, savings in water, better water utilization, ease of handling, and versatility in use.

Most of the Mirassou vineyard lies on an alluvial fan with slopes varying from 2 to 6 percent. Some small areas are steeper, with short broken slopes. The long, even slopes were easy to irrigate with downhill furrows. The short, steeper, broken slopes were difficult, however, if not impossible to irrigate. Irrigation by sprinklers has produced even distribution of the water over all the land.

The alluvial soils are deep and vary greatly in their ability to take water, depending on the texture of the surface soil and characteristics of the subsoil. Sprinkler irrigation has made it possible to get even distribution, regardless of soil properties. In several areas it was impossible to get water through the furrows because the soil was loose, gravelly, and open. Consequently, some of the plants suffered. In other places, the soil took water very slowly due to a heavy, slowly permeable subsoil, and it was most difficult to get sufficient water into the soil without extending unduly the length of irrigation time. Again, some vines suffered for lack of water. The fact that differences in soils did not coincide with the planting plan added to the difficulties and the care necessary in furrow irrigation. But by sprinkler irrigation the Mirassou brothers get water to all the vines, and can control the amount of water applied by adjustments of the sprinkler heads. They find it easy to be sure the soil is getting water at the maximum rate with virtually no runoff or erosion.

When applying water by furrows it first was necessary to make the furrows—three furrows between each two rows of vines—with tractor and



Sprinkling does not require a flat ground surface. The pipe line easily climbs across hills and swales.

equipment. This was followed by a continuous day-and-night schedule of running water until the desired amount was delivered. It took one man full time to do this. He had to start the water with sufficient head to force it through to the end of the furrow as quickly as possible without causing erosion. Then he cut back the head to maintain a constant, even flow of water through the furrow from top to bottom with a minimum of waste at the lower end. It took constant care and checking to do this as changes in soil conditions, changes in slope, variation in temperature, and variations in the head of water required changes in the water entering each furrow. The net result, despite the closest attention, was too much penetration at the upper end, insufficient penetration at the lower end, runoff and wasted water at the lower end of the field, uneven distribution within the soil and about the vines, and serious erosion losses.

The operation schedule for sprinkling, on the contrary, is simple. The Mirassou brothers apply 6 inches of water in 12 hours to an area of 1.8 acres. Their irrigation system consists of 2 laterals with 12 sprinkler heads for each lateral. It easily connects with the underground pipes already established on the ranch. In using this system, tractor and equipment work for furrowing is eliminated. Once the portable system has been brought to the vineyard, no further equipment work is required. The surface pipes are distributed up and down the rows, connected to the underground pipes, and the water turned on. The sprinkler heads are adjusted and no further attention is needed except for an occasional check while passing back and forth on other work. The proper amount and rate of application are judged by the rate the soil takes the water, and they are controlled by the pressure maintained in the line. At the end of 12 hours of sprinkling, two men disconnect the 20-foot sections of aluminum pipe, carry them over seven

rows, reconnect, adjust the water, and give it no further attention. It has taken the two men just about an hour to do this. There has been no soil erosion loss and no wasted water. Penetration and distribution of water has been uniform.

Observation of moisture penetration leads to the conclusion that the percentage of water lost by evaporation is very small. Twenty-four hours following sprinkling, penetration reached 2 or 3 feet; in 3 to 5 days it reached 3 to 4 feet; and after 8 to 10 days it had reached 4 to 5 feet or more. The surface dried slowly for the first 3 to 5 days, and after 8 to 10 days it was dry to about 2 inches. The only noticeable change in the next 2 weeks was more drying of the surface. Weed growth started in 8 to 10 days but as the surface dried, the growth slowed and it was not necessary to cultivate for weed control.

With sprinkler irrigation, cultural operations are simple. Following the winter rainy season and volunteer cover-crop growth, the vineyard is disked and weeds cleared from around the vines. No further cultivation is necessary unless weed growth following sprinkling is excessive, which has not yet been the case.

With furrow irrigation, the spring cultivation was followed with furrowing and then with tillage to remove the furrows. What were formerly three tillage operations have been reduced to one.

The Mirassous have one deep well that produces about 150 gallons per minute. This is not enough water for furrow irrigation, and it was necessary to buy water from neighboring wells to provide a total of about 1,000 gallons per minute. With the sprinkler system now in use, the home well and one other well produce sufficient water, about 250 gallons per minute, to run the sprinkler continuously, as well as to supply the needs of the winery and farmstead. With the lower volume of water applied by sprinklers, it has been necessary to lengthen the season in order to irrigate the vineyard but this is offset by less cash outlay for buying water.

The Mirassou brothers have estimated the comparative costs per acre of sprinkling and furrow irrigation of a 6-inch application of water as follows:

	<i>Furrow irrigation</i>	<i>Sprinkler irrigation</i>
Labor.....	\$4	\$2
Tractor	2	—
Water	25	8
	—	—
Total.....	31	10

Sprinkling has not increased disease and pest-control problems. As a matter of fact, these problems usually are less, and plant vigor better. Mildew is always a problem in this locality and it thrives under moist conditions. But thus far there has been no increase in mildew from sprinkling. Control seems to have been accomplished with sulphur dusting. The leaves dry rapidly after sprinkling, with no more residual moisture than is common on the frequent foggy mornings during the summer. Sprinkling washes the vines of dust and leaves the leaf surface a bright, healthy green. Removal of the dust decreases the Pacific-mite problem, for the pest thrives under dusty conditions. New, healthy growth was apparent following irrigation. Sprinkling tends to move plant food applied as fertilizer down to the root feeding zone, and feeder roots move into the sur-

face layer of moist, water-compacted, unworked soil, the best and most productive soil.

Besides the vineyard, the Mirassou ranch has approximately 18 acres of prunes and 40 acres of apricots. Following success in sprinkling the vineyard, the brothers sprinkled their prunes and apricots during the winter and spring. None of the anticipated problems have developed. The pipe was easily handled in the tree rows and sprinkler heads were lowered to get low-angle distribution of the water. By keeping the water down beneath the trees, no burning of foliage or fruit resulted. Apricots were sprinkled during the bloom and jacket stage without an outbreak of brown rot. Sprinkling orchards appears to be as successful as sprinkling vineyards. Several orchardists in the Santa Clara Valley have followed the lead of the Mirassou brothers and are now sprinkler irrigating.

DISTRICT PROFILE

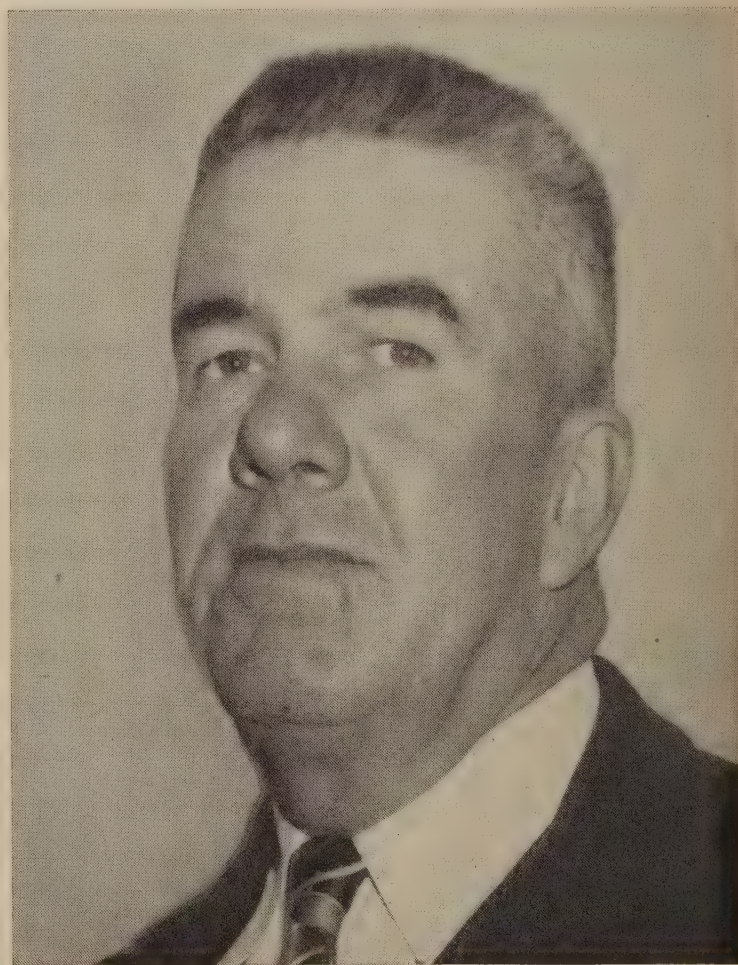
POOLE
of
NORTH CAROLINA

The sandhills section of North Carolina has produced many famous men. J. Hawley Poole, peach grower and conservation farmer of Moore County, is today carrying on the finest traditions of this land of the longleaf pine.

Poole is a recognized agricultural leader in North Carolina, having contributed much to the development of agriculture in the past 30 years. He has been a member of the North Carolina State Board of Agriculture for 14 years, and has just concluded a 1-year term as president of the North Carolina Association of Soil Conservation District Supervisors.

Poole has represented his county for three terms in the State Legislature. When the Sandhill Peach Growers' Association was organized in 1934, Hawley Poole was elected vice president. He has taken a very active part in the work of the association since that time. At present, he is a director of the National Peach Council.

After graduating from North Carolina State College in June 1917, he went directly to officers training camp at Fort Oglethorpe, Ga. He served as a second lieutenant in the Army's 81st Division



J. Hawley Poole.

and later transferred to the 156th Depot Division. After the war, in the fall of 1919, he returned to Moore County and became farm manager for E. A. Manice, who was the leading peach grower in that area. That fall they set out what was then the

largest peach orchard in North Carolina. He remained with Manice for 10 years as farm manager. In 1930 he bought a 166-acre farm near West End, N. C.

There was a time when the general public regarded the sandhill land as fit only to hold the world together, and Poole knew that in many respects this old saying was true. Around the turn of the century, land had sold for 75 cents to \$1 per acre, and no one dreamed that peaches could be grown on the deep sand. By 1916, however, several orchards had been planted and were in full production. Poole believed in the future of the sandhill peach and that it could be produced commercially at a profit. He went to work, and today has approximately 600 acres of peach orchards in Moore, Montgomery, Richmond, and Hoke Counties. He also operates a 400-acre apple and peach orchard in Surry County.

It has not been an easy job, but year by year the fertility of his land has been built up. He is a firm believer in the use of crotalaria as a soil-building crop on the deep sandy land. In 1936 he harvested enough crotalaria seed to plant two rows entirely around the earth's surface at the Equator with enough left over to seed a 100-acre plot. He says that anything so wonderful as crotalaria must have some catch to it; however, he has not found anything wrong with it so far.

Poole was one of the leaders in the organization in 1940 of the Upper Cape Fear Soil Conservation District, composed of Lee, Moore, and Harnett Counties. He had been a member of the State Legislature in 1937 when the North Carolina Soil Conservation Districts Law was passed and realized the tremendous importance of the conservation of soil and water in maintaining the fertility of the sandhill lands. At the first meeting of the district supervisors, Hawley Poole was elected chairman and for 10 years has been the "guiding light" in his district's program.

In his report as president of the North Carolina Association of Soil Conservation District Supervisors at the association's annual meeting in Burlington, N. C., on January 18, 1950, Poole spoke of the need for looking to the future.

"Education is, I think, our next most urgent need," he said. "In this I am thinking of the need for everyone to know about soil conservation. This would include district supervisors, farmers, and the general public. Beginning at home, we

cannot expect to do much unless we thoroughly understand our job. Not only should we have a good working knowledge of how to gain conservation but should thoroughly understand its far-reaching possibilities. When this is done, our hearts as well as our minds will make us worthy of the title of soil conservation district supervisors. We cannot accept too lightly this responsibility. Farmers, in far too many instances, have taken their own responsibility without serious thought. This applies to both those farmers who have not yet made a district farm plan and those who have. I am fully convinced that a deed to land does not constitute ownership. The land is old and will be here in some sort of condition for a long time to come. The life of man is very short in comparison. A deed gives us the right to use but not to abuse the acreage held by us under the terms of a legal instrument. Along with education as to responsibility as custodians of land, farmers should be informed of present-day advantages to be gained by doing a good job of conservation."

Poole has a clear conception of the problem of soil conservation, and he is a conservationist at heart. In 1948, as a result of using crotalaria and Austrian winter peas as cover crops on his orchard land, he produced a ton of peanuts and about a bale of cotton to the acre. A total of 195 bales of cotton was produced on 200 acres of land which had formerly been in orchard. In the same year, he produced 60 tons of Spanish peanuts on 100 acres that had formerly been used as a peach orchard, and 92 bushels of corn to the acre on a 5-acre block of land where he says "it was 40 feet down to solid clay."

Poole is not only applying conservation methods to his own land, but he is blazing a trail for others to follow.

—W. O. LAMBETH.

TRIPLED ACREAGE IN COVER CROPS.—W. F. "Bill" Eckhardt, Gussie Weaver, and Robert Gregory, all farmers in the Navarro-Hill (Tex.) Soil Conservation District, wanted to increase the planting of winter cover crops. They decided to establish a seed-cleaning plant at Wortham. In the first year of operation they did a landslide business. The plant cleaned and treated over 108,000 pounds of vetch seed and over 100,000 pounds of other seed—all at nominal cost to farmers.

Farmers figure the plant was worth \$30,000 to them, the market price of seed they harvested and cleaned themselves this year, and it made possible planting nearly three times as many acres of cover crops this fall.

The plant cost less than \$1,000 to install.

YOUNG RANCHERS LEARN ABOUT GRASSES



Davis presents award to first-place Comanche County 4-H team, representing the Upper Leon Soil Conservation District. Next to Davis is the team's coach, County Agent Ben R. Spears. The boys are J. W. Wright, Walter John Beaty, and Billy Fred Curry.

By SIMON E. WOLFF

TEXAS lads are getting the horse back before the cart. In the past, boys' clubs have placed emphasis on breeding and displaying blue-ribbon livestock. They have been taught to know good animals. Grass, the basic resource of the Texas livestock industry, was neglected. It is not surprising, then, that good grasses have disappeared or have been reduced to a small part of the vegeta-

tion on many thousands of range and pasture acres in the Southwest.

The trend is now definitely turning, however, and stockmen are realizing the value of knowing something about their good grasses and how to treat them. Their sons are learning about grasses, as a part of their schooling. They are taking part in grass-judging contests, an idea vigorously promoted by Waters S. Davis, Jr., rancher and president of the Texas Association of Soil Conservation District Supervisors.

Latest big-time contest was held at the 1949

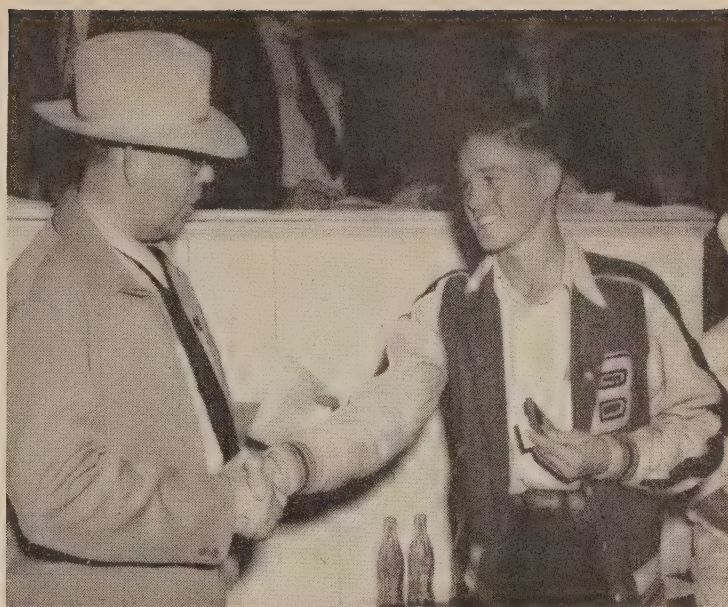
NOTE.—The author is nursery agronomist, Soil Conservation Service, Fort Worth, Tex.

Texas State Fair in Dallas. It was the first time that the State fair, seen by more than two million visitors, included a grass identification contest in its numerous events. Gold, silver, and bronze medals were awarded teams and individual winners.

Fifty teams of three boys each competed. They were required to identify and give the principal characteristics of 40 plants, most of which were grasses. The specimens were mounted on cardboard. A check sheet made it possible to give the answers by marking the proper squares. The contestants were allowed 45 seconds per answer. They moved from plant to plant at the sound of a bell. About 30 judges graded the papers.

The boys had to be familiar with the plants to get through the test in the time allotted. That entailed a lot of preliminary studying and local competition.

The Upper Leon Soil Conservation District team of Comanche County 4-H members won first place with 661 points out of a possible 720. On the



Gene Tomgate, individual high scorer, receives gold medal from Waters S. Davis, Jr.

team were J. W. Wright, Walter John Beaty, and Billy Fred Curry. The coach was Ben R. Spears, county agent.

The Brown-Mills Soil Conservation District



Louis P. Merrill, regional director, and J. C. Dykes, assistant chief of the Soil Conservation Service, peek over the shoulders of two youthful contestants to see how they're doing.

team won second place with 655 points. The Brown County 4-H boys composing the team were Gene and Bill Tomgate and Burl Wayne Posey. County Agent D. R. Alford was coach.

Third place went to A. M. Duncan, Doyle Hughes, and James Hill, the Mozelle FFA team representing the Central Colorado Soil Conservation District. They were coached in their preliminary studies by Rae Curtis, vocational agriculture teacher. Their score ran to 591 points.

Individual first-place winner was Gene Tomgate, member of the second-place Brown-Mills Soil Conservation District team. Gene made 233 points out of a possible perfect score of 240. Second was Billy Fred Curry, 225 points, and third was J. W. Wright, 221 points. Both were members of the winning Upper Leon Soil Conservation District team.

Other team winners were the Llano Soil Conservation District (Llano FFA unit), fourth place; Upper Elm-Red Soil Conservation District (Sherman FFA), fifth; Hamilton-Coryell Soil Conservation District (Evant FFA), sixth; Upper West Fork (Jack County 4-H Club), seventh; Little River-San Gabriel Soil Conservation District (Florence FFA), eighth; Upper Elm-Red Soil Conservation District (Gainesville FFA), ninth; and Hood-Parker Soil Conservation District (Hood County 4-H), tenth.

Other individual winners were Everett Farris, Upper West Fork Soil Conservation District, and Bill Tomgate, Brown-Mills Soil Conservation District, who tied for fourth with 220 points each; Walter John Beaty, Upper Leon Soil Conservation District, 215 points; Bill Stephenson, Dalworth Soil Conservation District, 210; James Hill, Central Colorado Soil Conservation District, 206; Jim Davenport, Hamilton-Coryell Soil Conservation District, 205; and Bobby Garret, Llano Soil Conservation District, 203.

Grass identification, new in the agricultural world, began on a local scale under sponsorship of individual soil conservation districts. With Davis pushing the idea as a means of teaching future farmers and ranchers while they are young, and as a step in the control of erosion and the restoration of desirable forage plants, grass judging was made a part of the competitive events at the Southwest Fat Stock Show and Exposition in Fort Worth in January 1949. That was the first time that grass was thought important enough to include among the judging contests of a major show.

Then the big stock show at Houston followed suit. In 1950, when another major stock show opens in the new arena in San Antonio, a grass-judging contest will be on the agenda. Grass and other range plants will then be in the spotlight annually at the State's big shows: Fort Worth, Houston, Dallas, and San Antonio. The State-wide contests are sponsored by the Texas Association of Soil Conservation District Supervisors.

BRUSH PILES ON CONTOUR.—Davidson Brothers farm at Charlton, Mass., is made up of a lot of those long hills that wash severely if plowed for any length of time. In 1949, while a hill was being cleared of juniper and brush, 2,000 feet from top to bottom, it was found most economical to do the entire job while the equipment was there. One bothersome problem hinged on what might happen when the whole piece was left exposed. This problem was taken care of by piling the brush in windrows across the slope to break the flow of water, and that's the way it is today—long horizontal strips of bright green Ladino pasture, in season, broken by windrows of brush piled on the contour across the field. This year, or in '51 these windrows will be rolled over with a bulldozer, burned, and the strips they occupied will be seeded.

FIRST-RATE FISH CROP.—Farmers' interest in obtaining fish for their farm ponds is indicated by the 2-year record in the Allegany County and Steuben County Soil Conservation Districts in New York. In that period 150 farmers have applied to districts for fish obtained through the Fish and Wildlife Service and the State Conservation Department, and every one of them has been Johnny-on-the-spot the day and hour the fish became available at a central distribution point. Ponds stocked since 1946 are yielding 16-inch trout, 14-inch black-mouth bass, and 9-inch bluegills.

FARM POND SCORES AGAIN.—A quarter million gallons of water in an SCS-designed pond at the Clarence Wittmer Dairy Farm, near Malta, Northumberland County (Pa.) district, enabled fire fighters from four nearby towns to confine flames to the house where they originated and save four other residences from probable destruction. The pond, built in 1947 at a cost of \$250, principally for fire protection, was the only water source within reach of firemen. It is a sky pond, with an auxiliary water supply from the overflow at the dairy plant. Water used by the fire fighters lowered the pond level about 6 inches. It refilled to capacity in 3 days.

GIVING THEM A GOOD START

The Montgomery County (N. Y.) Soil Conservation District directors are giving a 1-year subscription to SOIL CONSERVATION Magazine to each new district cooperator, according to I. B. Stafford, State conservationist.



Veterans from Tuscaloosa County, Ala., study scientific measures applied to farm of Isom Crawford, cooperator of the Tombigbee-Warrior Soil Conservation District.

FROM FOX HOLE TO FARM

By T. S. BUIE

SCATTERED over the face of the earth during the last war, American young men dreamed of returning to home and loved ones. Many of them yearned for the moment when they could get back to the business of making a good life on the land.

Somehow, the farm back home meant more to them than it had ever meant before. And as they watched the farmers of many foreign lands struggling to produce crops by primitive methods and with primitive equipment, they realized as never before what a wonderful opportunity they would have to make the most of farming with modern, scientific methods and equipment back home.

I want to tell you what some of these men are doing now.

Jesse Sykes of Route 1, Mebane, N. C., watched Arabs in Algiers farm with primitive methods while he served with the Army's Second Armored Division in the North African Campaign during

1943. "I determined then and there to do a better job of farming than my father had been doing if I ever managed to get back to Orange County," he says.

After taking part in the Normandy invasion and entering Berlin in 1945, Sykes turned his thoughts to farming in earnest. Discharged as a corporal in March 1946, he wasted little time moving onto the 23 acres he bought for \$980.

Today, \$2,500 wouldn't buy those 23 acres, because Sykes has improved the small Orange County farm so thoroughly. Soil Conservation Service technicians assigned to the Neuse River Soil Conservation District helped him make and apply a soil and water conservation plan for the farm. Sykes is now using every foot of his land in such a way that it gets better as it is used.

Here are some of the things he did to improve his North Carolina farm: Thinned 2 acres of pines, seeded 2 acres to orchardgrass and Ladino clover for pasture, blasted a drainage ditch, planted 2½ acres to alfalfa, contour-farmed 4 acres, and strip-rotated the remaining 16 acres.

As a youngster, J. T. Owens, Jr., delighted in splashing about the farm after summer showers, letting the Georgia mud ooze between his toes. But as a combat soldier with the 71st Division, 571st Signal Company, in France, he changed

NOTE.—The author is regional director, Soil Conservation Service, Spartanburg, S. C.

his opinion of mud. There he spent much of his time cramped in a fox hole with mud everywhere.

It was in that fox hole that young Owens vowed that he'd never let Georgia mud ooze through his toes again. And in 1946 Jay changed from his military uniform to civilian garb. He and his father operate a small dairy farm.

They have turned their farm near Covington in Newton County into a sea of green to supply lots of grazing and to keep the soil from washing away. Twenty acres of grasses and clovers for permanent pasture are kept healthy by regular liming and fertilizing. Twenty acres of terraced cropland in corn and annual hay crops, along with 20 acres of steep hill land in sericea, provide enough roughage for the 20-odd Jerseys.

Where there were once raw gullies, grass now thrives, aided by barnyard manure. An old abandoned roadway is blanketed with kudzu. Young Owens isn't taking any chances of having any more mud ooze between his toes. Instead, he prefers to let grass tickle his feet as he continues his soil conservation work with the Upper Ocmulgee Soil Conservation District.

For more than 3 years during the last war, Oscar Hurst of Tallahassee, Fla., was an Army ground radio operator. Now, he's just a plain ground operator, but doing a very good job of conservation farming on the 280-acre family farm he returned to as a corporal in 1946.

Hurst was a farm boy who loved the soil, the plants that grew there, and the animals that grazed on the plants. It was natural that he returned to the farm and changed to conservation farming after one crop year of corn, peanuts, and idle land.

After getting the SCS technician working with the Ochlockonee River Soil Conservation District to help him map out a complete conservation plan for the farm in late 1946, he began at once to plant blue lupine, build terraces, and apply other conservation measures.

The Florida farm looks a lot better now than it did when Hurst started to fix it up. About 130 acres are still in woods, but the 150 acres of cleared land are solid green. Hurst doesn't grow row crops any more; he just "plants the grasses and legumes and lets the cows graze them."

Although Hurst is in the process of building up a registered herd of Brahma cattle, he has had to graze some "piney woods" feeders on his pastures. This venture proved profitable, but Hurst ex-

plained that "improved pastures deserve improved cattle."

One of the finest things to happen when American farm boys returned to the home farms was the beginning of so many father-son partnerships. There's no better example than that of M. A. Reed and his son, A. B. Reed, of Weakley County, Tenn.

When the 35-year-old veteran returned to civilian life after serving as a Navy lieutenant (jg) deck officer on troop carrier U. S. S. *General W. A. Mann* in all theaters of the last war, he immediately began work on his father's farm. Young Reed bought half interest in all operating capital, and the father-son partnership began with a written agreement that is an excellent example of a landlord-tenant contract.

The 373-acre Tennessee farm has flourished under the team's careful management. The Weakley County Soil Conservation District helps by arranging for the services of SCS technicians. All steep slopes are held secure with thrifty sod crops for the registered herd of Aberdeen-Angus cattle, the brood sows, and their litters.

Sloping fields suited for cropping are carefully rotated and contoured. Swampland is drained and converted to fescue-clover pasture. Better bottom land is drained and converted to highly productive cropland. Tobacco, corn, small grain, and other crop yields have increased appreciably, while soil and water losses have almost disappeared.

"Dad and I consider soil conservation absolutely essential to profitable farming," the veteran explained. And as recognition of their good judgment and work, judges selected them as county, State, and regional winners in the father-son division of the 1949 Save-Enrich Our Soil Contest sponsored by Memphis organizations.

I could cite many examples of splendid conservation work being done by veterans throughout the Southeast. Veterans are making more progress than any other single group of district cooperators, say, many SCS men.

Vocational agriculture teachers and the veterans' instructors give excellent training opportunities in practical soil conservation to the veteran students. SCS men assigned to districts help in this work, as well as in farm planning and practices. It seems likely that returned veterans will prove to be the best conservation farmers of all.



WATER SUPPLY CONSERVED

By C. P. STARR

NESTLING among the crags of the lofty Wasatch Mountains near Draper in the northern part of Utah is a rugged chasm known as Bell Canyon. The crystal-clear, icy waters cascading down from the snowbanks are harnessed and stilled in the Upper and Lower Bell Canyon Reservoirs. These waters are stored for use by three irrigation groups including the Bell Canyon Irrigation Co.

Organized in 1892, the Bell Canyon Irrigation Co. is a nonprofit organization designed to furnish irrigation water to 68 farmers who operate on 3,400 acres of land. This water supplements the natural rainfall and is expected to make possible the successful growing of crops in an area of rela-



E. O. Brothers (left) and K. D. Searle lift baskets of fruit from truck preparatory to packing. Improving storage reservoir jumped crop production 25 percent in 1949.

tively arid climate. This company holds full storage rights on the lower reservoir, direct flow rights on the Bell Canyon stream, and a half interest in the upper reservoir. The reservoirs were constructed to store water during the nonuse seasons so it can be available for crops during the growing period.

In spite of all efforts to develop additional water supplies during recent years, however, officials of

NOTE.—The author is district conservationist, Soil Conservation Service, Murray, Utah.

the irrigation company found themselves still short of water needed to mature their crops successfully in the late growing season. This resulted in subnormal yields. Too, the relatively low prices for farm products over a period of years prevented the company from further development or even adequate maintenance of their irrigation system.

In 1945 the State engineer of Utah told officials of the irrigation company that the lower reservoir would have to be repaired or he could not permit the further storage of water. The stockholders faced the problem of either putting the reservoir in shape or abandoning their farming operations.

A rather feeble effort was made to repair the structure by annual assessments. This failed to provide the funds needed to do the job.

In 1948 E. O. Brothers, president of the company, contacted the Utah State Water and Power Board in an effort to obtain low-cost financial assistance for making reservoir improvements. He learned that, under Utah law, the company could borrow funds from the State through the State Water and Power Board without interest. Directors and stockholders agreed to do this and the loan was forthcoming.

Supervisors of the West Salt Lake Soil Conservation District, of which Brothers is secretary, gave the project special priority on its work program. Plans were furnished by the State Water and Power Board. Construction equipment was obtained through the West Salt Lake district, and technical services for the ground lay-out work were furnished by the Soil Conservation Service.

Repair and enlarging of the lower reservoir dam were started in the fall of 1948, and completed in the spring of 1949 in time to permit storage of early spring runoff water.

In reporting the success of the project, Brothers says: "The increase in the storage capacity of our reservoir has allowed us to have water approximately 30 days later in the season than ever before. This has given all of our people a third cutting of hay, which they had never been able to get before. Our grain and fruit crops also have been greatly benefited. The summer and fall of 1949 were as dry as any on record, so without this additional water late in the growing period we wouldn't have been able to mature our fruit crop. By having this additional water we matured the crop and increased production over previous years by at least one-fourth."

RADIO FLASHES DAY'S PROGRAM.—Farmers in the Perdido River Soil Conservation District of Florida can find out over their radios every morning just where the local SCS men will be working during the day, in case they want to get in touch with them while they are in their community. Elmer Jones, technician of the Soil Conservation Service, worked out arrangements for a daily spot announcement at 7 a. m. over Station WTAM, Atmore, Ala., which is just over the Florida line. Here is the way the announcer puts it:

"Soil Conservation Service workers assigned to the Perdido River Soil Conservation District will be assisting the following district cooperators during the day:

"At McDavid, Fla., Edward Bush is assisting T. J. Darby and Commissioner T. C. McCoy to complete a $\frac{1}{4}$ -mile waterway to keep water from a 20-acre field off the road.

"Charlie Howell and George Langford are helping H. H. Leonard, who is sodding a water-disposal area with 250 yards of carpetgrass. This is a part of Leonard's long-time soil and water conservation plan.

"Raymond Wiggins is working with Commissioner T. C. McCoy on control measures to keep water from fields from coming into public roads in the Byars community. Morris Miller, his father, C. O. Wilson, and Carl Victor are helping with this work as a part of their complete farm soil and water conservation plans.

"William Brown is working with Emmett Dennis, who is completing 1,200 feet of broad-base terraces as a part of his complete farm soil and water conservation plan".

ALABAMA SCHOOL PROGRESS.—C. T. Hallmark and B. T. Richey, of the Soil Conservation Service, are receiving more requests from teachers to give their talks on soil conservation in the schools and conduct farm tours for the conservation classes than they can handle. Eight teachers in St. Clair County, Ala., alone requested farm tours for their pupils during one recent month. Hallmark participated in a program on soil conservation at a county-wide meeting of the 160 teachers of the county and helped the program committee of the St. Clair Teachers Association work up their program for the year.

Plans have been made to enlist more teachers in Cleburne County, Ala., to teach soil and water conservation in the schools.





Mrs. Hicks supervises operations in this modern milking room. She shares actively with her husband the running of their farm.

HIGHER PRODUCTION, LOWER COSTS, FROM IMPROVED PASTURES

By RAYMOND C. PESNELL

MR. AND MRS. Grover C. Hicks have hedged against any likely drop in farm prices by pushing up production and cutting down operating costs. At the same time they have protected their 788-acre farm near Bernice, La., against soil erosion.

As a result of well-rounded conservation, Mr. and Mrs. Hicks are now getting an average of 80 to 90 gallons of milk a day from their herd of Jersey cows. Former production was only half that much.

Improved pastures, rich in nourishing grasses and clovers, furnish so much good grazing that the cows no longer must be fed hay in summer and fall—now they get hay only in four winter months.

"Our hay costs have been cut in half," said

Mrs. Hicks who knows conservation farming thoroughly and does a large part of running the farm. "Higher production and lower costs come from our conservation program. You can trace it to improved pastures, a well-distributed water supply, the strength of the grass and clover from fertilizing, and other conservation measures."

Mr. and Mrs. Hicks recently received a certificate of merit from the Louisiana Bankers Association for outstanding soil conservation work. The farm was about played out when Mr. and Mrs. Hicks decided in 1946 to change the use they were making of the land. At that time 400 acres of the farm had been in cultivation for years. Ugly gullies streaked across the fields. About 388 acres in woodland and swamps were always too wet to cultivate. The wet acres stood idle, producing nothing.

All that is changed. Three years ago Mr. and Mrs. Hicks became cooperators with the D'Ar-

NOTE.—The author is work unit conservationist, Soil Conservation Service, Bernice, La.



Robert H. Bolton, vice president of bankers association, hands Hicks (right) certificate of merit.

bonne Soil Conservation District. Through the district they obtained the help of Soil Conservation Service technicians on a coordinated program that included all the dovetailing practices the farm needed to control erosion and restore productivity. Mr. and Mrs. Hicks had already changed from row cropping to pastures. Now, with the help of their district, they were ready to carry out a whole conservation program in earnest.

Work was started on the pastures. The soil was given a ton of lime and 300 pounds of phosphate per acre. Bottom-land pastures were seeded with Dallis, Bermuda, Suiter's grass, ryegrass, and White Dutch clover. Hill pastures were seeded with Dallis, Bermuda, ryegrass, and Kobe lespedeza.

This combination of forage plants gives year-round grazing. The only time that the livestock can't get out and graze is when the ground is covered with snow. That doesn't happen often around Bernice.

To keep the pastures in prime condition, the conservation program calls for liming every 5 years and phosphating every 2 years. To permit deferred and rotational grazing, the grassland has been divided into four pastures by fencing, and another fence is to be built so that there will be five pastures. The stock can be shunted from

pasture to pasture to prevent overgrazing and to give each pasture a rest at the proper season. This system permits the good forage plants to maintain their vigor and to grow and spread.

"Last summer when there was a bad drought," Mrs. Hicks said, "our pastures stayed green. Pastures on farms around us were poor—dried up, brownish, burned-out looking. They didn't offer much grazing."

There was a time, before the conservation program, when Mr. and Mrs. Hicks had to haul water in a truck from Bernice, a mile and a half away, for their livestock. In carrying out the conservation program, they have developed two stock ponds and three improved springs that are completely enclosed to protect the water. Electric pumps force the cold, fresh spring water to seven concrete troughs scattered around the farm and to the big new barn. Another spring provides water for the household.

The cropland had already been terraced and the terraces are being maintained on the pastures. Some of the hill fields are steep and the terraces hold the rain until it can soak into the ground.

The swampland has been drained and put to good use as pasture. Forty acres of woodland have been cleared, another 60 acres are to be cleared. The rest of the woodland is being managed for perpetual yield. The woods are protected against fire. Trees are cut selectively so that the stand continues to help protect the watershed against erosion. It can be relied on to furnish an income from future cuttings.

Mr. and Mrs. Hicks have around 125 Jersey cows and heifers. They raise all their own heifers. They usually milk from 36 to 40 cows. In addition, they now have a herd of about 100 Hereford beef cattle. The milk cows are fed the usual concentrates but the beef cattle get no extra feed at all except in freezing weather when they are given some hay and a little cake. Dairy and beef cattle are supported from the 400 acres of improved pastures. And they are doing mighty fine by the looks of things.

SECRET OF PASTURE SUCCESS.—Farmers in the Alapaha and Altamaha Soil Conservation Districts in south Georgia are spending from \$30 to \$40 per acre to develop permanent pasture on land that cost them \$10 to \$15 per acre. The seeding of grasses and legumes adapted to the different soil types, plus proper fertilization, is the secret of the success farmers in this area are having in developing good pastures, according to R. N. Jobe, district conservationist.

HE MADE HIS FARM GREEN AND PROFITABLE



Fields relaxes while his wife fishes in the 2-acre pond in front of their house. The pond took the place of gullies.

By CAL L. ROARK

THERE'S a good living and financial security for the family that can take misused land and redeem it. That one thought stayed uppermost in my mind as I went about with F. O. Fields over his 320-acre farm near Gainesville in Sumter County, Ala.

Mr. and Mrs. Fields are rightly proud of their farm, their home, and their success in applying a complete soil and water conservation program to the run-down farm they bought in 1936.

Fields had the nerve to buy with borrowed money a farm that had been under mortgage all but 2 years since it was granted by the Government to its first owner about 125 years ago. In 1936 Fields was foreman in an SCS-CCC camp located on the near-idle farm. He realized that this land, even though scorched from frequent

fires and gullied in spots down to the white limestone, could be molded into a profitable farm with complete soil and water conservation treatment and hard work.

After the CCC camps were closed in 1942, the Fields family moved to the farm and started what then seemed to be a long drag. But the tall, lean farmer had learned lessons while supervising the work of CCC boys on other farms that made him know what to do.

That's why he enlisted the aid of SCS technicians assigned to the Black Belt Soil Conservation District. Together, they laid a master plan for handling the land—a plan that fit the land as well as Fields' preferences.

Today, 7 years later, the farm is completely covered with lush pastures and fast-growing timber crops—all except a 2-acre garden and truck patch. There are Caley-peas and Johnsongrass, Dallisgrass, white Dutch clover, Persian and Lappacea

NOTE.—The author is information and editorial specialist, Soil Conservation Service, Spartanburg, S. C.

clover, black medic, sericea, rescuegrass, sweet-clover, Kentucky 31 fescue, and reseeding crimson clover. These supply more than enough grazing and hay for all the beef cattle that Fields wants to keep. He buys what he terms "skin and bones" in the fall and grazes the animals until June or July, by which time they have gained about 300 pounds each. Then he markets them.

This allows him to harvest an abundance of seed and surplus top growth for hay and mulch. No grain is produced or fed on the farm—just hay and pasture. The Sumter County farmer not only harvests bumper seed crops but also cleans the seed in his own cleaner on the farm.

Here's an example of the returns from one 17-acre field: In 1944, the field of Dallisgrass, Caley-peas, and mixed clovers carried 12 small steers for 8 months, giving them all they could graze. He then harvested 10,000 pounds of Caley-pea seed, 2,890 pounds of Dallisgrass seed, and quite a bit of mixed clover seed. A 3-year gross income from seed alone on this field amounted to \$180 an acre.

Bees and controlled grazing both contribute to the heavy seed yield. Fields keeps 25 stands of

bees mainly to aid pollination. Fertilizers play an important role, too. Each year, about 300 pounds of fertilizer are applied to each acre. Lime is not needed because all of the open land is sweet "prairie land."

By February 1947 the land that had been kept mortgaged for nearly 125 years was clear of all indebtedness. It is stocked, well-equipped, fenced, has adequate barn and shed space. The Fields have a comfortable modern home and are preparing to build another for the newly married son who has decided to farm with his father.

There are other improvements, too: 25 acres of pines set out in 1936 on washed and abandoned cropland; a 2-acre farm fish pond in front of the home, where Fields finds rest while Mrs. Fields wields her favorite rod and reel; 5 other small ponds scattered over the farm to supply needed stock water.

"I figure my place would bring more than five times what I paid for it," says Fields. "But, of course, I don't want to sell it. It's all clear, paid for with money that came from cattle and seed from soil-conserving crops."

NOTES FROM THE DISTRICTS



Molof, McNeill, and Dewey.

of Dewey, he saw 1,100 feet of diversion terrace, 20 feet wide, built and seeded. The terrace, built on a gentle but severely eroded slope, will catch and divert water flowing from an adjacent farm. It was built in 3 hours by Dewey's farm workers, using regular farm equipment—two tractors and two plows. The complete conservation farm plan at High Time calls for grassland farming in strips reseeded parallel with the new terrace.

McNeill told Dewey and Jerome Molof, of the Soil Conservation Service, that until after World War II there seemed to be no pressing need for soil conservation on English farms, since most of the hilly country was in pastures. During the war it became necessary to cultivate all available land, which entailed the breaking of a great deal of sod. Since then, he said, English farmers and government leaders have seen erosion, increasing from year to year, even in the more stable soils of the country.

PRACTICES WHAT HE PREACHES.—Theodore Hegseth, of Carlisle, Minn., is chairman of the board of supervisors of the West Otter Tail Soil Conservation District. He operates about 850 acres of land and in the past few years has dropped his corn acreage from 250 to 80. The capability map developed by the Soil Conservation Service showed that his land needed longer rotations.

"Before making the change we took an awful licking from sheet erosion on a couple of fields," Hegseth reported. "On one 50-acre field of corn we lost an inch of soil in one rain. It had been cropped heavily and was low in organic matter."

VISITOR FROM OVERSEAS.—Hector McNeill, British cabinet officer, took back to London, after his recent visit to the United States, some first-hand information on conservation of soil and water. He got a practical demonstration of these methods at the High Time Farm of Charles S. Dewey, Jr., at Far Hills, near Somerville, N. J. There, with Somerset County farmers who also were guests

A GOOD IDEA FROM TEXAS

When the Starr County Soil Conservation District supervisors got ready to have the district's program and plan issued in printed form, they went to the daily newspaper in Mission, Tex., found out how much it would cost, then went out and sold enough advertising to pay the printing bill. The newspaper people cooperated so closely that they became interested in conservation and invited the supervisors to furnish the newspaper with news items about district operations.

With the newspaper's help, the supervisors put out a fine brochure embodying the program and work plan. *They made a \$300 profit on the deal. With part of the profit they subscribed for 100 copies of SOIL CONSERVATION Magazine*, one for each businessman who advertised in the brochure and one for each key farmer assisting with the district's work. District supervisors are: R. T. Margo of Rio Grande City, chairman; Rafael A. Guerra, Linn; Gorgonio Guerra, Viboras; Jose P. Vera, Grulla; and Raul Gonzales, Roma.

MORE HELP COMING UP.—Soil and water conservation and good land use will be accented in the program of the million dollar FFA-FHA State camp project announced by the West Virginia State Board of Education. The camp will be located on the gently rolling 228-acre Easter farm, 2 miles south of Ripley, Jackson County. Construction will be started in 1950.

Authorized by the 1949 State Legislature, the camp—first of its kind in the State—will serve the Future Farmers of America, the Future Homemakers of America, and other school groups. The facilities also will be available to other organizations for educational meetings.

Development of the project will make it possible for school children from all parts of the State to get together under the direction of competent personnel for the purpose of building leadership, cooperation, citizenship, improved agriculture and homemaking, wholesome recreation, and other purposes.

Financing will be by public donations to the State FFA-FHA Foundation, Inc., and the State Board of Education. It is expected that members of these and other school groups, and rural, civic, and business organizations will lend financial support.

Preliminary planning calls for housing to accommodate groups of 500 or more persons in comfortable cottages. There will be a dining room, chapel, assembly hall, swimming pool, and facilities for indoor and outdoor recreation, sports, and social activities. The development will eventually include a museum and a center to promote teaching of home crafts.

The site lies across Mill Creek from U. S. Highway 21, and is three-fourths encircled by the stream. It was chosen from a group of four farms in as many different counties after inspection by engineers and architects.

AGRICULTURAL CENTERS.—Early in November Everett C. Norberg and T. Swann Harding made an automobile trip through parts of New York State to visit a half dozen unified county agricultural centers. Both are with the Department of Agriculture—Norberg, in the Office of Plant and Operations, and Harding, editor of the employees' news bulletin, *USDA*.

In these locally initiated centers all Department workers, insofar as can be arranged, have offices. This includes Soil Conservation Service, Extension Service, Production and Marketing Administration, and sometimes production credit associations, Federal land banks, and Farmers Home Administration.

The idea behind such centers is to enhance efficiency, eliminate confusion, and make for greater convenience to farmers. The farmer who brings his problems to a Department representative does not like to be sent along to some other building or perhaps even to another town in the same county.

Each agency in the center pays about the same amount toward operation of the center as would go for rent otherwise.

The centers are usually removed from the heart of town and have ample meeting and parking facilities. They are paid for generally by local subscription and fund-raising schemes. In New York they are usually owned by the Farm and Home Bureau and 4-H Club associations, and other agencies pay rent. The grouping of specialized workers together is doing wonders to build up a healthy esprit de corps and improve the effectiveness of all.

On this trip, Harding reports, a car was provided by Irving B. Stafford, State conservationist, stationed in Ithaca. They visited soil conservation workers in centers at Penn Yan, Mount Morris, Batavia, Albion, New Hartford, and Cobleskill. The first soil conservation district in the State of New York was organized at Cobleskill in Schoharie County. Before the agricultural center was occupied soil conservation work was in the town of Schoharie. Also visited were the offices of District Conservationist Everett H. Clark in Oneonta and the Broome County soil conservation work unit in the courthouse at Binghamton.

"At Waterloo, Seneca County," says Harding, "we came across a rented setup which proved to be a sort of halfway house to an agricultural center. Here the Soil Conservation Service, the Production and Marketing Administration, and the Extension Service were neighbors under one roof. Formerly, not even Extension was united in one place, some of its work being in Romulus, though SCS was already in Waterloo. Here a very important point was well made by Emil Kahabka, of SCS, who remarked that it is very easy to misunderstand a fellow and think him a fool unless you work by him, come to know him well, and thus understand his agency's objectives and why he does what he does as he does it.

"Largely through local initiative and contributions, New York State now has 10 unified county agricultural centers in its 56 counties and Monroe County is raising money for a center."

FARMERS ATTACK SPECIAL PROBLEM.—The district supervisors in seven northeastern Illinois counties (Grundy, Livingston, Kendall, Will, Kankakee, Iroquois, and La Salle) have organized the Upper Illinois Association of Soil Conservation Districts. The purpose is to investigate soil conservation methods suitable for an unusual soil type common to the group.

When farmers in the association learned that the Soil Conservation Service would not have money to install a research station that had been proposed, they pitched in and did most of the work themselves. They have come in neighborhood groups, each bringing his own tools and donating a full day's work. The station is on a 200-acre tract allocated by the Army near Joliet. Will County farmers nearby have furnished their own trucks. The men have erected buildings and dug trenches and excavations for silt boxes. The work is progressing ahead of schedule. The Will County Farm Bureau contributed \$500. Donations from soil conservation districts and farm bureaus now total \$800.

When the experimental work is under way and these farm groups come to visit the station—and you can bet they will come—it will be “our” station. Who said that old-fashioned neighborliness is dying out?

CHANGED DIET.—W. H. Dewey of the West Otter Tail (Minn.) Soil Conservation District says his cattle need less bonemeal since he started using more phosphate in carrying out his soil conservation farm plan. He hasn't seen a cow chewing on a bone or a board in the last 4 years. “Now,” he says, “they get the necessary nutrients from grain and hay raised on soil kept fertile by conservation farming.”

Dewey helped organize the district and has been on the board of supervisors since its beginning in 1945.

PROFITS FROM TERRACES.—Increased yields from terraced and contour-tilled bean fields in the Edgewood Soil Conservation District in New Mexico not only paid for the cost of construction in 1 year, but also brought an average of \$7.29 more income to the acre than from straight-row fields.

A survey of the 1949 crop revealed that terraced and contour-farmed fields yielded an average of 600 to 700 pounds of beans to the acre and that some produced as much as 1,000 pounds. Yields from straight-row fields ran from 200 to 300 pounds less.

Figuring the average increased production from terraced fields at 250 pounds to the acre, and the price of beans as \$6.25 per 100 pounds, \$15.62 more income is shown to the acre from terraced and contoured fields.

Terraces in this area cost \$125 a mile and there are about 15 acres of cultivated land to the mile of terraces. At this rate, terraces cost \$8.33 per acre.

Therefore, the \$15.62 increased income from terraced fields not only paid the \$8.33 terracing cost, but an additional \$7.29 profit per acre. The terraces can be expected to bring increased yields from now on, while checking soil erosion.

78 MORE DAYS PASTURE.—In the same 16-acre pasture field, with the same registered Guernsey dairy herd, during the severe drought, Frederick Winthrop, Groton House farm owner, Hamilton, Mass., got 78 more days of grazing in 1949 than he did in 1948 because he irrigated.

From an SCS-designed bypass pond (60 x 100 x 8 feet) in a marshy area, a tractor-mounted motor pushed 500 gallons of water per minute through heavy 6-inch main lines and 5 sections of 20-pound, 4-inch aluminum laterals, and distributed 1 inch per acre, at a pumping cost of 98 cents per hour for 1-acre inch of water. The pasture was divided into six even sections for rotational grazing, and each received 27,000 gallons of water. One man moved the laterals from section to section, 15 minutes being required for each shift of equipment.

Winthrop turned 25 milkers into the pasture early in the spring. Irrigation was started May 17 and used 6 to 10 hours daily until July 12 when it went on an every-other-day schedule. Each section was seeded to smooth brome-grass, orchardgrass, Ladino, and creeping fescue before the irrigation system was installed. Soil is naturally droughty.

In 1948 without irrigation, Winthrop got 9 tons of hay and 61 days of grazing for 27 milkers. This year the same area produced 139 days of grazing for 25 milkers, with 15 additional animals in the pasture 35 days in June and July. There was no let-down in the quantity or quality of milk produced and the animals maintained their weight.

Out of his experience with irrigation, Winthrop suggests—

- Build the pond large enough to do the job.
- Divide the pasture so rotation will be easy.
- Apply plenty of fertilizer for seeding.
- Top-dress heavily on old sod.
- Lay the main pipes permanently.
- Use only lightweight pipes for moving.

HIGH WHEAT YIELD.—Fifty bushels of wheat to the acre was obtained by L. C. Ratliff from a 12-acre field near Fort Sumner, N. Mex., in 1949. Ratliff gives most of the credit to the soil and water conservation program he is carrying out with the De Baca County Soil Conservation District. This particular field had been difficult to irrigate because of high and low spots, and the crops had been spotty and yields poor.

In the spring of 1944 Ratliff used district equipment to level the 12 acres. He then floated, irrigated, and plowed the field several times before planting alfalfa.

Ratliff's crop-rotation program called for alfalfa 4 years, followed by small grain. After the last cutting of alfalfa in 1948, Ratliff plowed the field and seeded wheat at the rate of 108 pounds per acre, obtaining an excellent stand.

Cattlemen offered \$500 for the wheat pasturage, but Ratliff figured that the grazing was worth as much as that to him. The field was grazed from October until April and then yielded 50 bushels of 63 percent protein grain to the acre.

Figuring the pasturage at \$500, Ratliff says that the 12 acres brought him \$1,650 or \$137.50 per acre.

REGISTRATION CARDS.—A feature of the soil conservation field day by the Eau Claire County (Wis.) Soil Conservation District and other groups was the issuance of registration cards prepared and distributed by the Eau Claire Chamber of Commerce. The card:

No.-----

Name----- Address-----
 Township----- Section-----
 County----- State-----

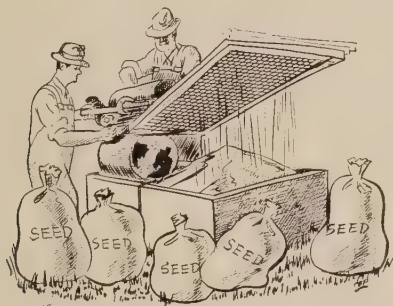
Fill in and leave at registration booth. Must be handed in to be eligible for valuable prizes.

1. Are you an active farmer?
2. Are you a cooperator with your local soil conservation district?
3. Do you want a Soil Conservation Service man from your district to call on you at your farm?
4. What conservation practices are you interested in?

 Signature

According to District Conservationist Keliher, 2,505 cards were given out; 632 farmers asked for assistance; many indicated the practices they were interested in. Cards filled out represented 21 Wisconsin districts; 10 cards were from Minnesota farmers; 2 were from Iowa visitors; 2 were from residents of New Mexico, and 1 was from an individual from the State of Washington.

The cards were sent to the respective field headquarters of the Service. A different card was used for school children and 1,100 of these were turned in.



BLUESTEM CLEANER.—Home-made contraptions have sprung up in many Texas districts. Two of the latest were originated in the Dalworth Soil Conservation District.

After using all sorts of time-worn methods of drying their recently harvested King Ranch bluestem, the Hebron conservation group rigged up a scalper to clean the seed. Main parts of the scalper were a 3- by 8-foot screen made of hardware cloth framed with light wood, and a 1/3-horsepower electric motor that drove an off-center shaft.

One end of the screen, vibrated by the shaft, was lowered and the clean seed fell through the hardware cloth into a bin underneath.

A. C. Stone, another Dalworth cooperator at Grapevine, used an old two-row, team-drawn cotton planter to make himself a Bermuda grass sprig planter. He mounted the planter on automobile wheels and built a metal platform to hold the grass sprigs. Then he added chutes of 11-inch diameter, covering disks, and a tractor hitch. The

machine worked so well that Stone donated it to the Dalworth district to be used in establishing terrace-outlet waterways on farms in his neighborhood.

PROMOTING A BIG SHOW.—In staging "Operation New Look" as its face-lifting enterprise, the Mercer County (W. Va.) USDA Council developed several interesting promotional ideas. The Princeton Bank and Trust Company offered a cash prize to the farmer traveling the longest distance. Another prize was offered for the best name for the Peter F. Pennington farm, where "New Look" was established. Pennington, a World War II veteran, is buying the 88-acre farm on the FHA loan plan. There were 21 different projects in the "New Look," among them being pasture renovation and treatment with lime and fertilizer, alfalfa seeding, home and farmstead improvement, construction of a farm pond, and a new farm road and sheep barn.

WATERWAYS MULTIPLIED.—Development of waterways before the building of terraces was a drag on progress in the Whitesboro and Gainesville work units in the Upper Elm-Red Soil Conservation District of north Texas. But a little friendly wager took care of that.

The Whitesboro work unit staff challenged the Gainesville staff to a contest to see which would get the larger number of waterways done in helping cooperating farmers to apply their conservation programs. The contest was to cover the first half of the year and the waterways were to be properly protected with vegetation.

The loser was to provide all the food and fishing gear for a picnic on Lake Texhoma. Recently the Whitesboro unit paid off.

"The important thing," says State Conservationist Paul H. Walser, "is that this friendly competition got a lot of conservation work done. In the Gainesville work unit area 84 vegetated waterways were completed in the first 6 months of the year, in the Whitesboro area, 62. Both work units considerably exceeded past accomplishments."

GREEN ACRES.—Not many years ago the Spurlock-Wetzler ranch in the Agua Fria Soil Conservation District near Phoenix, Ariz., was a rough, rugged piece of desert known as Lizzard Acres or Rattlesnake Gulch. Then Spurlock-Wetzler began to develop the ranch step by step, with the assistance of SCS technicians.

Initially, small diversion dikes were constructed, as were contour ditches, to divert floodwaters. Then came leveling of some 300 acres. Barnyard manure was added at the rate of 10 tons per acre. This put the ranch into farming operations in a big way.

The roughest and hilliest land was left out of cultivation and was used for feeding pens for cattle, trench silos, and ranch buildings. The ranch operators know that water is scarce and that even distribution is a necessity, so they have taken every possible step to conserve water from source to field. Some 4 miles of concrete-lined ditches have been constructed to prevent waste.

One field which was leveled with cuts ranging up to 1½ feet in depth produced 16 tons of ensilage to the acre this year. Thus, Lizzard Acres has become Green Acres.

WATER MAKES THE DIFFERENCE.—Bench leveling, or bench terracing as it is sometimes called, often is thought of as a new-fangled idea. However, Jimmy Sanders is farming 12 acres of land near Duncan, Ariz., that were leveled into benches about 25 or 30 years ago.

Records show that Fred Powell built these old benches by hand and with horsepower by first constructing dikes and then diverting muddy water from nearby Apache Wash into the diked areas. In those days Apache Wash was a fairly reliable source of water, but the flow later became erratic and undependable. Finally, the condition developed whereby the wash was either in flood or bone dry, so Powell had to abandon his farming enterprise but not until he had the benches in good shape.

When Sanders bought this old farm about a year and a half ago he called upon the Duncan Valley Soil Conservation District for assistance in getting the land back into production.

Soils information furnished by technicians revealed that the bench terraces built by Powell had trapped a lot of good soil behind the dikes. An engineering survey showed that the old benches could be irrigated just about as they were.

Sanders' first move was to drill a well to supplement the water from Apache Wash. SCS engineers then assisted with the construction of an elevated ditch to take the water from the pump to the bench-leveled area, and to the vicinity of the farmstead for the irrigation of a garden, small orchard, and trees and shrubs around the house. A small storage pond was constructed near the farmstead and several small irrigation structures were installed to aid in efficient control and distribution of water.

Since several sections of range land go with the Sanders farm, he plans to operate on a livestock basis. The complete soil and water conservation program which SCS technicians assisted Sanders in preparing provides for keeping most of the irrigated land in alfalfa, small grains, and irrigated pasture. The construction of more water-control structures and the lining of the supply ditches with concrete are parts of the conservation program yet to be carried out.

Sanders seeded 5 acres of alfalfa last fall and the remainder of the irrigated land is in wheat which is being pastured during the winter. The grain will be harvested next summer and the crop stubble and residues will be turned back into the soil to improve fertility.

The fruit and shade trees which Sanders planted around the home he built on the farm have made excellent growth because plenty of water now is available through the elevated ditch.

HEAVY MULCH, NO PLOWING.—Jim Chadbourne, North Bridgton, Maine, has pioneered in the use of mulch on very dry ground. He raises bumper vegetable

crops. After 2 years of mulching with sawdust and shavings, now 4 to 6 inches deep, Jim reports that "cauliflower headed in the summer, sprouted and grew a second crop, some stumps producing four to five salable heads. Radishes, lettuce, spinach, beets, and chard planted July 2, did very well and grew very fast. None wilted during the terribly hot weather in July and August. Lettuce heads weighed up to 3½ pounds."

Chadbourne's ground is never plowed. Sawdust and shavings are added every fall. Poultry manure and other fertilizers rich in nitrogen are harrowed into the mulch without disturbing the ground. A roto-tiller is used to grind the crop residue and work it into the mulch. "I have grown potatoes on soil that was full of sawdust, and had no scab," Jim Chadbourne says.



HE BEAT THE DROUGHT.—Fred L. Bascombe, a dairy farmer of Cumberland, R. I., was well prepared for the big drought. His pastures and meadows kept green, he harvested a second crop of good hay—strong in Ladino—he kept his 21 cows on pasture, his herd's milk production held up well, and his corn made a good yield. Bascombe is chairman of the Northern Rhode Island Soil Conservation District.

Success in combating the severe June-July-August drought stems from conservation work Bascombe first started himself and then completed with the assistance of technicians working with the district. It involved the lengthening and deepening of a sluggish, silt-blocked, shallow, narrow waterway that wound through a half mile of bog.

Bascombe, a former milk-truck driver and machinist without farming experience, was warned that the equipment would get stuck in the muck, that his well would dry up, and that numerous other dire things might happen.

He was not easily discouraged. He kept on slowly working with the water course, using his own equipment and that of a contractor, for 2 or 3 years. Then the district and Soil Conservation Service technicians came along with heavy equipment and engineering knowledge. The job then moved faster and the cost became less. He reclaimed nearly 20 acres of swamp last year.

Use of water from what is now a well-maintained ditch kept Bascombe's fields and crops green in 1949 when those of others were burning up. He mounted a high-capacity water pump on a tractor, pulled the water from many points along the ditch, and moved it over his fields through several hundred feet of 2½-inch hose to which a 50-foot length of sprinkling pipe was attached.

With a district stoneboat Bascombe cleared many acres of boulders and put the land into production. He has done a lot of fertilizing and liming in pastures and meadows. "You just have to take care of pastures and meadows. They won't produce year after year if you let them go without attention," he says. Conservation farming has cost me only \$300 in cash. Look at all I have already gotten back—and there's a lot more coming!"

MORE GRASS, LESS EXPOSED SAND.—The list of benefits from soil and water conservation grows longer daily. A Citrus County farmer of the Gulf Soil Conservation District recently told others on a tour of local farms: "The old lady is easier to live with now since the house is not covered and filled with sand."

And the native Floridian, whose grandchildren are now maturing in the same community where he was born, added: "This conservation program sure is redeeming this country. I well remember how the sand from this field where cows are now grazing on good grass used to bank up against the property line fence and cover my young peanuts."

PASTURES CREATED.—Because most of his own farm was stony and brushy, John Mann, farmer of Gloucester, R. I., rented cropland from neighbors. He became interested in conservation and started with a woodland improvement project. One day, after a talk with SCS technicians assigned to the Northern Rhode Island Soil Conservation District, he agreed to risk a little money by clearing 7 acres for pasture. It was seeded to Ladino clover. The job paid for itself the first year. Now he is spending \$1,000 for clearing. Twenty-four acres already have been cleared and more of this work is planned.

DREAM REALIZED.—Back in 1916, in his fourth biennial report, J. A. Viquesney, West Virginia forest, game, and fish warden, invisioned the day when there would be "hundreds of small farm ponds constructed throughout all sections of the State, and stocked with fish." No State in the Union, he wrote, "is so admirably adapted for constructing artificial ponds for the raising of food fish as is West Virginia, and nowhere is the industry so neglected." Today, Viquesney's dream has come true, but in a bigger way than he imagined. Instead of hundreds there are thousands of farm ponds. In the first half of 1949 alone, 250 were built in West Virginia. Farmers there are asking SCS technicians, working with soil conservation districts, to plan 3,565 and over 2,000 already have been constructed.

QUICK RESULTS FROM WATER.—With a 500-gallons-per-minute pump, 2,000 feet of 4-inch pipe, and 25 No. 70 nozzles, set up to cover an acre at a time, Roland Sanborn, conservation farmer at Gorham, Maine, brought a closely

grazed Ladino pasture to about an 8-inch growth that blossomed in 10 to 12 days. In September, when the 1949 drought was getting in some powerful licks, he set the system up on a field with a gradual slope toward the source of supply, and at intervals of 3 hours for 4 days pumped a half million gallons of water on the pasture, without curtailing the supply in two springs. Corn also was irrigated with excellent results.

CHANGING MIND PAYS.—One summer day C. W. Knibbs, dairy stock farm owner, walked into the Northern Rhode Island district office at Greenville and announced that he had cut over a pond site, engaged a contractor with a bulldozer, and was ready for some technical assistance. An SCS technician visited the farm and worked up a complete conservation farm plan including a pond. He rejected the site selected by the farmer because the soil there would not hold water. A good site, in a low drainage area close to the dairy barn, was suggested. It took a lot of explaining to convince the farmer that this site would be better. The pay-off came during the 1949 drought when the water level in the pond held up so well that Knibbs had water for pasture irrigation. On the site he originally selected there would have been a dry hole.

HOPES FOR RETURN OF NATIVE GRASSES.—Francis E. Perry, a rancher who is also an editor, is a staunch supporter of the program of the Upper Leon Soil Conservation District, Dublin, Tex.

Perry was the first rancher in his part of the State to harvest Indiangrass seed as a commercial crop, and he'd like to see the day when that grass is growing again as it did before it was grazed almost out of existence.

The originator of the widely read "Perrygraphs" column finds it easy enough to change from editor to rancher by merely switching his urban derby for a wide-brimmed Stetson.

SCHOOL PROJECT

The Dodge County (Minn.) Soil Conservation District is furnishing a one-year subscription to the SOIL CONSERVATION Magazine to each village school in the district, reports Klaus Alberts, board chairman.

Plans have been made for a tour by school pupils to Whitewater State Park. In connection with this, Clifford Toquam has conferred with the Claremont superintendent of schools. The tour of one or two bus loads of pupils will be held sometime in May. It is expected to reveal a good many soil conservation problems. The Whitewater area is being purchased by the State of Minnesota because erosion and runoff have spoiled much of it for future agriculture. The district board will invite other schools to take part in the tour.



J. S. Russell presents plaques to Leavitt, Lensch, Benitt, Phariss, Ralston, Barr, and Bennett.

NEW RECORD SET.—A crowd of 70,000 or more came early and stayed late at the National Soil Conservation Field Day and Contour Plowing Match near Runnells, Iowa, last September. The attendance probably topped all figures for this type of event last year. Farmers, businessmen, school children, teachers, and professional people crowded onto four farms to see new life brought to old fields by contouring, terracing, ditch blading, tiling, pasture renovation, and many other operations.

Entries in the plowing contest included representatives from Iowa, Nebraska, Missouri, Minnesota, Wisconsin, Indiana, Ohio, Kansas, and Illinois. Dean Wilson of Urbana, Ohio, retained his national title.

High light of the program was the presentation of awards by the *Iowa Farm and Home Register* to H. H. Bennett, chief of the Soil Conservation Service; Kent Leavitt, Millbrook, dairyman and president of the National Association of Soil Conservation Districts; Julius A. Lensch, Harlan, Iowa, district commissioner; William A. Benitt, Hastings, Minn.; Donald Phariss, Liberty, Mo., president of the Missouri Association of Soil Conservation Districts; Kenneth Ralston, Roscoe, Ill.; and Everett Barr, president of the Nebraska Association of Soil Conservation Districts. The awards were presented by J. S. Russell, editor of the *Register*.

An engraved plaque was presented to Russell and to Herb Plambeck, farm service director of radio station WHO, for outstanding service in soil and water conservation, by Chris H. Jensen, chairman of the State Soil Conservation Committee in Iowa.

The 1949 affair was sponsored by the *Des Moines Register and Tribune*, radio station WHO, and the Polk County Soil Conservation District, with the cooperation

of many local and State agencies and organizations, including Extension Service, Soil Conservation Service, Farmers Home Administration, Production and Marketing Administration, and Polk County Farm Bureau.



KOREA STUDIES OUR METHODS.—Suh Kwang Jin studies farm-plan map as Lester Lawhon, Soil Conservation Service irrigation engineer, Fort Worth, explains how maps are prepared. Suh was to return to his post with the Farm Land Bureau at Seoul on completion of a 5-month study tour in the United States. He was one of nine Koreans here to study ways for improving his homeland's agricultural economy. His main interest is irrigation. A portable sprinkler system can be seen in background irrigating a field of alfalfa.



May, 1950

Soil Conservation

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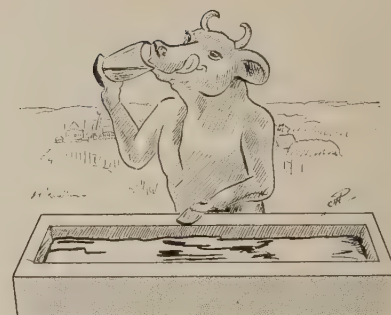
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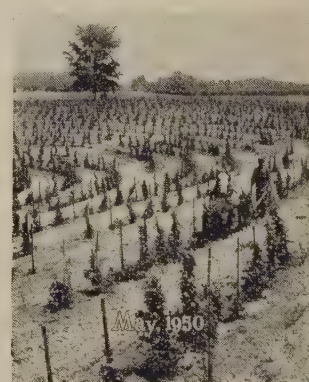
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HELP AT TROUGH.—When cooperators in West Virginia's Upper Ohio and Little Kanawha Soil Conservation Districts get down to the job of building a stock watering trough, the districts help them by providing use of steel forms at a cost of \$4 for the first trough, \$3 for the second, and \$2 per trough thereafter. The forms can be assembled in 30 minutes, and removed in 25 minutes. Concrete sets about 36 hours before the forms are removed.

The 1,100-pound forms cost the districts \$196.80. The largest sections weigh 200 pounds. The forms are used to cast troughs 7 feet 6 inches long, 2 feet deep, and 2 feet 4 inches wide (inside measurements). The walls are tapered, 6 inches thick at the bottom and 4 inches at the top. The job requires 32 cubic feet of 1-2-4 mix. The trough holds 255 gallons. Each district owns one set of forms and both sets now have been in constant use almost a year.



FRONT COVER.—A very unusual practice is shown: dewberries supported by stakes instead of wire trellis. They are on contour, of course, which is *not* unusual. The farm belongs to William Daly, Berrien County, Mich. Photographer is J. E. McKittrick.

SEVEN GENERATIONS ON AN INDIANA FARM

By R. H. MUSSER

MANY well-informed Americans are watching with apprehension the continuing upsurge of population in this country and the equally constant decline of soil resources.

Aside from the limited new land which can be brought into production through drainage or irrigation, there are no new frontiers remaining in this part of the Western Hemisphere.

Most people are willing to concede that American standards of living must tumble if population, already past the 150-million mark, continues to increase at the rate of 6,000 new Americans a day or 2½ millions annually. This hypothesis is predicated on the assumption that the United States will continue to lose the equivalent of 500,000 crop acres each year through wind and water erosion.

However, alarmists might strike a more optimistic note after a visit to the farm of J. Lee Foster, near Attica, Ind. For here lies the answer to our dilemma. Seven generations of Fosters have helped to work out the solution, and it is a relatively simple one. The answer: sustained maximum productivity of our existing

NOTE.—The author is regional director, Soil Conservation Service, Milwaukee, Wis.

cropland through the soil conservation type of farming.

Since the beginning of time, no man has ever cultivated this western Indiana farm except a Foster. Benjamin Foster who lived in Madison County, Ohio, took out the original land patent October 11, 1825. Shortly after that his son, James, loaded his young wife and baby into a prairie schooner and followed the setting sun westward to Indiana. By the time James died in 1845, much of the native prairie sod had been broken out and put under cultivation.

Little farm land in the country excells the Foster farm from the standpoint of potential production. Of the 220 acres, all except 60 acres of rolling land on the north quarter lies as level as a table top. The predominating soil is Wea silt loam, black and rich in organic matter. It is well-drained land with a gravel underlay and the topsoil ranges up to 3 feet in depth. Yet even land of this kind can be ruined by poor management.

Little is known about the early Fosters, but by the time George Foster took over the land in 1875, the pattern of good stewardship was already becoming evident. George, fourth in the line of descent, was the father of J. Lee Foster, present owner.



Grass waterway where Foster stands, with diversion at left, was once a gully.



Some of Foster's fine Angus cattle.

In his day, George Foster was regarded by his neighbors as a "clover crank." While others followed corn with corn, George Foster practiced a 4-year rotation of corn, oats, wheat, and clover. And in drought years his yields doubled those of neighboring farmers. His principal income came from sale of clover seed and livestock. "Give me enough rain to get the crop up in good shape and my land will raise a good crop without another drop," he told his friends.

In his declining years George Foster turned the farm over to his son and a few years before his father's death in 1922, J. Lee Foster became the owner. Today he is still active in managing the land, in partnership with his son, Paul Foster, who lives in a new bungalow built not far from the home place.

J. Lee Foster began with a 4-year rotation of corn, oats, wheat, and clover, and as early as 1912 was spreading lime. As a result, he produced one of the first good crops of alfalfa ever grown in Fountain County.

Since then the entire farm has been limed regularly with never less than 2 tons to the acre being applied every 4 or 5 years. Heavy applications of fertilizer are also a standard practice. In an average year the land receives 400 pounds to the acre of 8-8-8 fertilizer which J. Lee Foster and his son, Paul, plow under with sweetclover. In addition,

150 pounds per acre of 0-20-20 is drilled in the row on corn that same season and a like amount of 3-18-9 for oats.

Because the land is level, with deep, productive topsoil, the Fosters are able to use shorter and more intensive crop rotations than are generally recommended. Their basic rotation is corn, oats, and sweetclover. In addition to corn and oat land, the farm includes three 14-acre fields which are in a corn-oats-clover rotation and are used for poultry.

The north 60 acres of rolling land has been developed as permanent pasture, part of it in birds-foot trefoil and the rest in an alfalfa, bluegrass, and trefoil mixture. Here graze some of the finest registered Aberdeen Angus cattle to be found in the Midwest.

The foundation cow was "Enchantrene 6th", bred on the Tolan farm near Pleasant Plains, Ill., and winner in her class at the International.

Principal income comes from cattle and poultry. J. Lee Foster carries 2,000 white leghorn laying hens through the winter and few poultry plants are more modern or so well managed. For J. Lee Foster believes in producing a quality egg and marketing it on a quality market. That's why eggs from the Foster farm command a premium.

All manure from the Angus herd and the poultry yards goes back on the land and every stalk of

crop residue is plowed under. Because this well-managed farm usually produces more corn than the livestock will consume, the Fosters market the excess but they put the proceeds back into fertilizer and lime for the soil from which the corn came.

When Fountain County farmers organized their soil conservation district, electing J. Lee Foster as a supervisor, this "permanent farm" was one of the first to be visited by technicians of the Soil Conservation Service. J. Lee Foster and his son had a problem no Foster had ever been able to solve—a big gully on the north 60 acres.

SCS technicians are no strangers to such gullies nor are they in doubt as to the remedy. They helped the Fosters develop a complete farm conservation plan, based on the scientifically determined capabilities of the land. And they helped them develop a well-engineered water disposal system which wiped the gully from the face of the farm.

Brush which had overgrown the flats at the lower end of the big gully was cleared away, a 1,000-foot diversion was built to protect it from further flooding, and today a fine meadow grows on what was once waste land. The entire drainageway above was reengineered and developed into a gently sloping grass waterway. That was the end of the gully.

Proof that the permanent type of agriculture the Fosters practice pays off in dollars and cents can be found from a study of the farm records.

In analyzing these, Purdue University economists were amazed to learn that the Foster farm during the lean year of 1932 returned 11.8 percent on the investment. That same year 81 average Indiana farmers had a return of *minus* 0.8 percent.

In 1946, 64 Indiana farms averaged 66.8 bushels of corn to the acre. The Foster farm made 90. On measured acreage checked by the college in 1948, one field on the Foster farm averaged 127.6 bushels of corn and the other averaged 144.9 bushels.

One generation ago a good corn crop on the same land would have averaged 50 or 60 bushels. But the Fosters of 1950 have better fertilizer, hybrid seeds, and a soil conservation system of farming. With poor soil these new advances are to less avail but the Fosters have been good stewards of their soil. It is as productive today as in the days when their forefathers turned it with a sod-buster and worked it into a smooth seedbed by

dragging their fields with the top of an old crab-apple tree.

Here, then, lies the answer to America's problem of expanding population and declining soil resources—a complete farm conservation plan, providing proper land use and treatment according to needs, developed by the farmer with needed technical assistance made available through his own soil conservation district. By this route can be found a permanent agriculture which maintains maximum productivity of the land and insures that future Americans will be able to maintain a decent standard of living.

DISTRICT PROFILE	WRIGHT of IDAHO
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Silas L. Wright

Silas L. Wright, president of the Idaho Association of Soil Conservation Districts, has spent a large part of a full lifetime working for the betterment of his community and for others. It was no surprise to his friends when he took the

leadership in getting the Bear Lake Soil Conservation District organized in southeastern Idaho back in 1940. Nor were they surprised this year when Idaho's soil conservation leaders chose him to head their State association.

Silas Wright is a mild-mannered, soft-spoken man with an uncanny knack for getting things done. He likes people and people instinctively like him. The perpetual twinkle in his eye attracts people and his friendly warmth and inspiring counsel seem to bring out the best in them. His ability to work with others and direct their energies toward a stated objective has earned Mr. Wright the reputation as one of Idaho's outstanding community leaders.

For more than 45 years he has devoted long hours and considerable personal expense to the affairs of his church, the Church of Jesus Christ of Latter-Day Saints. From 1906 to 1908 he filled a mission to California, paying all of his own expenses and devoting his entire time to church work. Later, he served as branch mission president and bishop of his local Bennington, Idaho, ward from 1911 to 1918. When the Montpelier stake of the Latter-Day Saints Church was formed, Mr. Wright was named councilor to the president of the stake and served in this capacity until 1937 at which time he was himself appointed president and served until 1947.

Throughout the period of active service to his church, Wright found time to manage a community store in Bennington, become one of southeastern Idaho's leading farmers, serve four terms in the Idaho Legislature, and help direct the affairs of his community as county commissioner.

In his farming operations, Silas Wright has always applied the same temperate philosophy that has governed his personal, everyday living. He believes that the soil should be treated with kindness and proper care; he wouldn't think of overworking his land any more than he would abuse or overwork his livestock.

In recent years, Wright has scaled down his farming operations considerably. When he first became interested in scientific soil conservation and helped organize the Bear Lake district back in 1940, he was farming some 640 acres, most of it in dry-land grain with just enough irrigated pasture to feed the livestock, which he thinks every farm ought to have. He has since reduced his holdings to a little over 200 acres with only about

146 acres in dry-land grain and the rest in pasture, hay, and irrigated alfalfa. There is still room for livestock on the Wright farm, however. True to his convictions, Wright always has two or three dairy cows and a few calves and has worked out a unique livestock-management plan that leaves him free to come and go as he pleases. When he and Mrs. Wright are there, they milk the cows for home use. When he is gone, he lets his friends milk the cows and keep the milk in return for feeding them.

Wright's son, E. Dean, is a graduate of the University of Chicago and is now serving on the faculty of the University of Utah.

In talking with groups of people, Silas Wright has a habit of clearing up confused points by drawing on a seemingly endless stock of personal anecdotes, drawn mostly from his experiences on the farm near Bennington. The humble logic of his stories, coupled with a humorous twist that is usually present, seldom fails to dispose of differences of opinion.

Idaho's soil conservation leaders have no doubt as to the future of their State association as long as Silas Wright is on hand to help guide its affairs.

—WILLIAM L. SOUTHWORTH.

STATE MAKES MONEY.—Practices installed under its complete conservation farm plan since October 1948 were a main factor in the establishment of a new operating profit of \$5,557.13 at the State's Pinecrest Sanitarium farm in West Virginia in 1949. After operating costs amounting to \$42,000 had been deducted, Secretary George W. Ballard says profits in the dairy amounted to \$3,243.08, while profits in operations were \$2,314.05.

Dairy production amounted to 60,000 gallons of milk. The milk was consumed by sanitarium patients, staff members, and employees. Other farm production included 29,600 pounds of pork, 298 bushels of oats, 422½ bushels of wheat, 17 tons of hay, 220 tons of ensilage, 5,075 pounds of cabbage, and numerous minor items. The 11 full and part-time employees were paid salaries and wages totaling \$13,500.

Pasture management has been so carefully conducted that the pasture season has been increased 1 month, Charles Vaughan, superintendent of State farms, reports. The pasture program at Pinehurst is considered to be the best among State institutions. Under the improvement program established by Vaughan, farm production increased 20 percent in 1949. The farm is a cooperator in the Southern Soil Conservation District. Its complete conservation plan is being revised in cooperation with Floyd F. Rothlisberger, SCS district conservationist, for inclusion of more detailed forestry and game food and wildlife cover practices.



Grouped here are several technicians representing county, State, and Federal agencies cooperating in insect war. The Julian Soil Conservation District took the lead and coordinated operations.

TEAMWORK WINS IN SOUTHERN CALIFORNIA

By **LEE O. HUNT**

A FEW years ago, representatives of several agricultural agencies met to discuss a local problem in San Diego County, Calif. Opinions differed as to the responsibilities and limitations of the agencies. After a few heated remarks had been made, a silvery haired veteran of many years experience sagely observed: "It would appear that the problem confronting us is sufficiently large and complex for all of us to chew on instead of wasting our energies chewing on each other."

From that time on, the philosophy of cooperatively chewing on mutual problems became deeply rooted in San Diego County, where some 116 farm products are grown commercially. Topography varies from nearly level land at sea level to rough

mountain slopes of 6,000 feet or more. The average annual precipitation ranges from 41½ inches to 42 inches, including snow. The wide variation creates many difficult and complex agricultural problems. It also explains to a large degree why farmers have organized 11 soil conservation districts in the 1 county. This is a story of how one of these soil conservation districts and the community it serves went about getting the necessary help to solve an emergency problem brought on by a 2-year drought and the aftermath of war.

The Julian Soil Conservation District covers much of the upper watersheds of four of the six main river and drainage basins of San Diego County. Thus, the district is guardian for a large part of the water supply for metropolitan San Diego and surrounding cities and for the county's coastal and valley farm lands.

The little mountain town of Julian and the dis-

Note.—The author is work unit conservationist, Soil Conservation Service, Julian, Calif.

district area are hosts annually to many thousands of visitors, tourists, and vacationers who flock from San Diego, Los Angeles, and cities of the Imperial Valley.

The district directors, equally cognizant of their responsibilities to farmers, ranchers, and the land and people below, have pursued a vigorous program of soil and water conservation for dry land deciduous orchards and for range and timber lands.

Tremendous demand for lumber and wood products during the recent war jumped logging operations from a few hundred thousand board feet per year to several million feet. Lumbering had never been extensive enough in southern California to warrant its being classified as a timber-producing area. Consequently, provisions of the California Timber Practices Act which regulate cutting and slash disposal were not administered in the district. The urgency of getting war-needed lumber out of the forest led to indiscriminate cutting and the leaving of vast quantities of slash in the woods. This created serious fire and insect hazards.

Rainfall during the 1945-46 season was far below average. The following year's rainy season yielded barely half the normal precipitation. Humidity repeatedly dropped so low as to be hardly measurable. Only constant vigilance by county, State, and Federal fire organizations prevented major disasters that would have denuded the vital watersheds and caused heavy loss of property. The area breathed a sigh of relief when the worst of the fire season was past. But no sooner was the threat of fire gone than another menace appeared. Frantic calls from farmers, resort operators, cabin and home-site owners, townspeople and even tourists, told of pine trees dying in wholesale lots. By the spring of 1947, some areas showed as high as 90 percent of all pines killed on the drier south slopes. The usual endemic population of western pine, red turpentine, and engraver bark beetles had suddenly flared to epidemic proportions.

Another year of drought might wipe out all pines in the district. The epidemic posed a threat as well to the magnificent sugar, yellow, Jeffrey and Coulter pines in nearby Cuyamaca State Park and in the Cleveland National Forest Mt. Laguna Recreation area. Dynamic leadership and effective action were needed.

The board of directors of the Julian Soil Conservation District invited representatives of the Soil Conservation Service, the United States Forest Service, the State Division of Forestry, the Extension Service, the San Diego County Department of Agriculture and Natural Resources, and the Julian Chamber of Commerce to meet and discuss the emergency. It was shown that—

- (1) Private, county, State, national forest, and public domain lands were all infested.

- (2) None of the agencies had authority or funds to carry out a control program throughout the afflicted area.

- (3) The State Division of Forestry could, under existing State laws, declare a Forest Insect Protection Zone, and match funds raised from local sources and carry on control work. It was necessary, however, that a responsible local organization be established through which the agency could work. Such an organization was needed to publicize the problem, solicit and collect funds, and obtain permission for State forestry crews to enter all properties to remove infested trees.

Such a committee was formed to organize a pine beetle control project. Specific actions and responsibilities were taken and assigned—

- (1) The Julian Chamber of Commerce was selected as the local organization to publicize the project, make necessary contacts, raise funds, and handle finances.

- (2) The Bureau of Entomology and Plant Quarantine was requested to furnish technical guidance in making surveys and planning methods of control.

- (3) The Soil Conservation Service through The Julian Soil Conservation District furnished aerial conservation survey maps showing vegetative types, as well as recent aerial photographs showing infested areas. Property lists, land-use data, and other information gained in farm conservation planning and contracts were supplied to the committee and cooperating organizations.

- (4) The State Division of Forestry agreed to furnish spotting and survey crews, foremen, supervision and administration of the field project, power and hand tools and equipment, and half the cost of the control work.

- (5) The United States Forest Service had been carrying on beetle control work in the



Speed was a key factor in the rout of the beetles. Farmers and technicians used the most modern tactics and equipment. Field crew members here man a power saw to cut through a fallen pine.

Cleveland National Forest and supplied valuable advice in the use of new techniques, materials, and control crew organization.

(6) The County Department of Agriculture and the Agricultural Extension Service assisted in publicity and public relations.

Within a month the committee sponsored a panel discussion of the undertaking before a dinner

meeting of the Julian Chamber of Commerce. Excellent news coverage in county and urban papers told the story of the menace to the pine forest.

The committee sent a circular letter to all property owners and others requesting assistance. Crews began spotting infested areas and assembling material and equipment. Contributions be-

gan to arrive and by the time the fire season was over in the fall of 1947 insect crews took to the field.

It soon became evident that the job was too big for local people to finance by themselves. The committee went before the county board of supervisors and asked the county to match funds raised locally. Hearings brought out the splendid cooperation and coordination of the many organizations involved. The county agreed to finance a fourth of the cost of the work. Other organizations such as the Grange, the Women's Club, the Ancient Order of Foresters, the soil conservation district, as well as private land owners, contributed funds.

Throughout the winter and spring, three crews worked to cover the protection zone before the next fire season halted operations. By 1949 all areas of severest infestation had been treated and the Bureau of Entomology and Plant Quarantine made an intensive survey, under the direction of F. P. Keen of the Forest Insect Laboratory, to determine the effectiveness of control work done and the status of insect population. On January 16, 1950, Keen wrote the Julian Pine Beetle Committee:

"I'm pleased to see from your letter of January 7 that the Julian community is planning to go ahead with the maintenance beetle-control program recommended by this laboratory. The beetle epidemic has now been reduced to the point where only a limited amount of work each year should be sufficient to keep it under control, at least in the more important recreational areas. Our Mr. Engen recently made a survey of the area in which he found that the total 1949 loss in the Julian-Pine Hills area was approximately half that of 1948. He estimated that there would be about 250 trees requiring treatment this winter. In the Cuyamaca Park area, where no control work was done, there was a threefold increase in 1949 loss over that of 1948. It would seem that in the face of very adverse timber-growth conditions the control work in the Julian area held losses much below what they otherwise might have been."

To forestall conditions which might lead to another pine beetle epidemic at some future date, the committee and district, supported by the chamber of commerce, requested that the Julian and surrounding timber lands be classified as a timber-producing area under the State Forest

Practices Act. As a result of this request and the work under way, surveys were made and San Diego County was included in the Southern Sierra Pine Timber area. The State Division of Forestry is thus empowered to assist timber owners and loggers in woods sanitation and in administering State forest laws, particularly in regard to slash disposal. The community is hopeful that this step will prevent any large-scale epidemic of pine beetles from ever again threatening San Diego County's timber, watershed, and recreation areas.

NEW COOPERATORS RECEIVE GIFT.—For several years the Bent (Colo.) Soil Conservation District has sent 14 subscriptions to SOIL CONSERVATION Magazine to schools, supervisors, the library, and so on. Beginning with 1950, the district decided to give each new district cooperator a subscription. The following letter is used to announce the gift:

DEAR ———:

We wish to welcome you as a new cooperator in our and your soil conservation district. It is sincerely hoped you will continue with the excellent start you have made toward a perpetual farming operation of your farm through soil and water conservation.

As a new cooperator we are having sent to you, free of charge, a one-year subscription to "Soil Conservation" magazine, the official organ of the Soil Conservation Service. We know you will find this an exceptionally interesting publication, and it is hoped you will see fit to renew your subscription at the end of the year.

Very truly yours,

(S) C. P. Bryant,
C. P. BRYANT,

President, Board of Supervisors.

POTTER AND CLAY.—For generations the family of J. G. Teague had followed the potter's trade in Moore County, N. C., and Teague himself is a skilled potter. But he has decided, as a cooperator in the Neuse River Soil Conservation District, to give up the job of molding pots in favor of molding land.

"All my life I have molded clay, and a good potter earns good wages," he commented. "But I like working with the land better, and it pays better. I realize that just as it takes skill to mold pots, it takes skill to work with the land. So I went to the Soil Conservation Service man, whose trade is working with the land, and he has been able to show me how."

42 MILES OF DRAINAGE.—Cooperators in the Greenbrier (W. Va.) Soil Conservation District have installed 42 miles of tile drainage in the last year. A tile ditcher and 24 carloads of tile were used. Good corn and grass are growing on land that was too wet for use last year.

THEY FOUND SECURITY ON IRRIGATED LAND



Modern home and attractive lawn reward the Suras for courage and foresight in being first settlers in Buffalo Rapids project.

By WILLIAM A. HARKIN

IT was only a 6-mile move for John Sura, his wife, Meta, and son, James. But in a sense it was a long journey—from 960 acres of dry land and a precarious existence to 103 irrigated acres and comparative security.

The Suras were the first settlers in Division I of the Buffalo Rapids irrigation project near Glendive, Mont., the first of its kind to be completed in the State.

They have farmed this place for 8 years now, and know what this project means to the people. They raise most of the feed for a 38-head dairy herd on a little over 2½ acres of land per head; on the dry land it took 10 times as much.

"I don't think I ever could go back to the old farm," Mrs. Sura explained. "We lived there over 25 years. We had some good years, and we had some bad ones. I'll never forget the terrible drought in the 1930's. We never were sure, and we couldn't have a lawn and flowers.

"Now, we have this beautiful lawn around the house, and flowers and trees and garden. It's much nicer living here. That means a lot."

The Suras, of course, aren't the first Montanans to move onto a new irrigation project. They are, however, the first to move onto one where land

had been prepared for irrigation before it was settled and where new farm units were laid out—irrespective of section lines—so that each could support an average family.

That is what distinguishes the Buffalo Rapids lay-out. Under the terms of the Case-Wheeler Act, the Bureau of Reclamation was charged with developing the irrigation water supply and building the canals to deliver water to each farm and the major drainage structures.

The job of the Department of Agriculture was to procure the land, lay out the farm units, level the land, develop it for irrigation, lay out the farm irrigation and drainage systems, sell the units and make collections.

This project is in a narrow strip about 50 miles long adjacent to the Yellowstone River from Glendive to Terry. Four pumping plants along the river supply the water. The total irrigated project area includes 25,907 acres, 16,472 acres having been in Government ownership and 8,435 acres having remained in private ownership.

Division I, the largest part of the project, has been finished and most of the farm units that were Government-owned have been sold. Land preparation has been finished on the rest of the project, and installation of concrete irrigation structures for control of the water is under way. When this job is finished, the farms in Division II will be ready.

This development work was done only on the federally owned lands. Technical aid was supplied to owners of private lands without cost, on request, and construction equipment was made available if desired. The land owners paid full cost of such developments.

First step, after buying the lands that were for sale, was to make a complete topographic map of the area. As parts of the map were completed, they were turned over to soils technicians to map the soils information on them. Both surface and subsurface soil conditions were examined and the land classified into four capability categories. Three of these are land that can be irrigated. The fourth class remains dry land.

Other agricultural specialists developed cropping plans adapted to the local soils, climate, and

NOTE.—The author is soil conservationist, Soil Conservation Service, Glendive, Mont.

marketing conditions, and determined the approximate size of farms needed to employ a farm family, provide a good family living, pay the cost of annual farm operations (including annual irrigation construction, operation, and maintenance costs), and provide for overhead expenses incident to farm ownership.

Thus, before any development work was undertaken, the amount and location of the land that could be irrigated satisfactorily and the size of unit needed were known. With this information at hand, the Soil Conservation Service technicians outlined the farm boundaries on the project map, providing enough Class I and II land to give a reasonable net return under average management. Such Class III land and dry land as exists in the project is attached to the various units in a way to assure efficient use.

The boundaries were checked on the ground to determine their soundness, to be certain that they conformed to topography, and to find out how well the shapes of the fields contributed to efficient operations. This map also guided the Bureau of Reclamation in locating laterals and main drains.

Engineers of the Soil Conservation Service then made detailed topographic surveys of the land to be leveled, planned the farm distribution system, staked the cuts and fills needed, and supervised the leveling work. Leveling work on Government-owned land was done with Government-owned equipment.

After the land was leveled and floated, the SCS engineers laid out the farm irrigation and drainage systems and supervised installation of check, turn-out, drop, and siphon structures needed to control the water. Irrigation ditches were plowed out with a machine pulled by a small track-type tractor.

As soon as the land was leveled and the distribution system constructed, it was leased temporarily to a cooperative, the Buffalo Rapids Farms Association, formed by local farmers. Its purpose was to make the land produce some income pending the time the farms were ready for sale. Further, this offered an opportunity to have the land in soil-building crops for a period before it was sold.

Sale of the farms took place in small groups as soon as they were ready. To date, 61 units have been sold in 4 groups ranging from 8 to 23 in number. Twenty-five units and a community pasture (some dry land that lies above the main sup-



Mr. and Mrs. Sura and son, James, in yard of home near Glendive, Mont.

ply canal) were ready for sale last fall. Eight units are being withheld from sale until the main drain shall have been built by the Bureau of Reclamation and the land can be irrigated safely. Twenty-four of the units are feed bases for operators who run livestock on dry-land range. The other 70 units are complete irrigated farms.

These sales have not been made on the first-come-first-served basis. The farm units are first appraised on the basis of their long-time earning powers under average management. Then applicants for purchase are "screened" by a family-selection committee made up of six local residents and the project supervisor for SCS. These men look into the applicant's background to learn his experience and in this way assure that settlers are qualified farmers who will have a good chance of succeeding. Each purchaser is given a map of his farm and a conservation plan is worked out for it. Qualified veterans of World War II get preference.

It is to be noted that most of the families that sold their dry land to the project are now purchasers of irrigated farms.

The Suras were the first. They started operating the place before the house and other buildings were built. They have had to make some adjustments during the transition from dry-land to irrigation farming, and as is true with all newly irrigated places, some further smoothing of fields has been necessary.

"But we've got it in good shape now and the production is good," Sura said, shaking himself into his work clothes, for it was just before milking time and he had just got back from a trip to town.

"Even with army worms attacking the oats last year, we made better than 50 bushels per acre."

All of the production of the farm goes to feed the dairy cattle. Alfalfa is raised for hay. Annual crops are principally oats and other feed grains. The cows are pastured on irrigated grass.

Milk is bottled on the farm and sold to customers on the route. This, and the garden and some flower culture as a hobby, is son James' major part of the venture. He has modernized the milking barn, and the milk is handled and bottled in a modern milk house.

"No, I didn't have trouble learning to irrigate," Sura continued. "It did take a little time to iron out some kinks, but that didn't amount to much."

"Now, Dad," Mrs. Sura interposed, "I remember several times you were pretty grumpy and ready to go back to the old farm."

Sura grinned.

"Well," he said, "I wasn't used to it, then. I guess I did get a little grumpy, all right. But honestly, this has been a whole lot different than starting out from scratch to make an irrigated farm all by myself."

"Sure, there was still some work to do. You can't get it perfect the first time. Fills don't settle evenly, so there will be some high spots to be shaved off and a few places where a little more earth has to be added. But really, there isn't a lot of work needed. This place was actually ready to operate when I got it."

Sura also was impressed with the way the farm was laid out and then appraised on the basis of the earning power of this particular unit, not on the basis of a generalization of a group of farms.

"We were given a 40-year contract," he explained. "And I believe that under most circumstances this farm could pay out with reasonably good management. As it is, we've had some better-than-average years and are quite a bit ahead of schedule. We expect to get the farm paid for in just a few more years."

The Suras like their irrigated farm better than ever this year. The neighborhood from which they came had trouble again. Their old friends saw crop hopes dashed by a shortage of moisture. It is a precarious sort of farming that they left behind.

And since they are in the Dawson County Soil Conservation District, they can continue to get

help from SCS technicians and from other farmers in the district after the project is fully completed.

It takes a little more initial investment by the Government to develop an irrigation project this way than it did when water was delivered to the high point on a farm and the rest of the job was up to the farmers individually. Usually with only limited resources, these people faced a heart-breaking job, trying to make a living and at the same time get their farms under irrigation. Many failed.

The Buffalo Rapids project office opened in November 1939, when negotiations to buy the land were begun.

Families here are succeeding. And the Soil Conservation Service has shown it isn't necessary to "plow under a couple of generations before an irrigation project can succeed." Already the average value per acre of crops produced on this is listed fourth highest among all the irrigation projects in the country.

FARM POND STOPS FIRE.—When flames virtually wiped out a \$40,000 farm machinery center and \$50,000 in equipment, at Jefferson, Frederick County, Md., in February, water pumped from Hershel Boyer's 2-million-gallon spring-fed farm pond a quarter mile away enabled firemen from four nearby towns to confine the fire to the one building and save several adjacent structures, a large barn, and a hay stack, some of which were smoldering. Firemen strung 3,000 feet of hose and used two pumpers, one at the pond and the other as a booster at a relay point, to develop 100 pounds stream pressure.



62 FARM PONDS.—Cooperators in Frederick and Catoctin (Md.) Soil Conservation Districts have built 62 farm ponds under the guidance of SCS technicians, at a cost of \$33,816.98. This is an average of \$545.54 per pond. Aggregate area under water is 43.2 acres. Forty-four of the ponds have been stocked. After 2 years, bass in some of the ponds are 10 inches long, while bluegills weigh one-half pound and are 8 inches long. At least 150 pounds of fish should be taken from a pond yearly to keep production balanced.



Grass-timber forage type; fair to good condition. Soil is sandy loam, 8 to 20 inches deep, on clay and rock substrata. Production of good forage grasses and legumes is satisfactory but would be improved by applying good grazing practices.

EROSION ON MOUNTAIN PASTURES IN ITALY

By W. T. WHITE

AN important phase of grazing-land management on the highland pastures of Italy is the control and prevention of erosion of the topsoil.

Mountain pastures, as the uncultivated mountain grazing lands are called in Italy, are usually located at elevations of 1,200 to 2,600 meters. They are of three general forage types, with each of which the kind and extent of erosion can be correlated.

Soil erosion is usually much more severe on the dry-meadow type and steep slopes of the grass-timber type than on the wet-meadow type. In some instances wet meadows have changed to dry meadows, deep gullies having permanently lowered the water table or former moisture-producing slopes having become denuded and barren. In other instances, however, the flora of the dry-

meadow type is a reflection of the inherent texture and porosity of the soil and subsoil—particularly the subsoil.

The mountain-meadow types resemble closely in floristic composition many of those found at higher elevations in eastern Oregon and northern California. A wet-meadow type, located in the southern Alps, at Cavalese, a short distance north of Trento, has a floristic composition very close to that found in some of the higher meadows in the mountains of northeastern Oregon.

1. *The wet-meadow type*, when in good condition is characterized by such species as: Tufted hairgrass—*Deschampsia caespitosa*, sweet vernalgrass—*Anthoxanthum odoratum*, redtop—*Agrostis vulgaris*, mountain redtop—*Agrostis rupestris*, bluegrass—*Poa alpina* and *P. pratensis*, sheep fescue—*Festuca ovina*, red fescue—*Festuca rubra*, mountain fescue—*Festuca pulchella*, wild fescue—*Festuca silvatica*, mountain timothy—*Phleum alpinum*; and such legumes as: *Trifolium pratense*, *T. repens*, *T. badium*, *T. montanum* and *Lotus corniculatus*, with a scattering of such weeds

NOTE.—The author is regional range conservationist, Soil Conservation Service, Portland, Oreg. Scientific names and spelling are based on "Flora Italiana Illustrata," by Prof. Adriano Fiore—Tipografia Editrice Mariano Ricci—Florence.



Dry-meadow forage type. Soil has all been eroded from rolling hills in background. The floor of the meadow has lost 6 to 8 inches but is still producing a fair quality of forage.

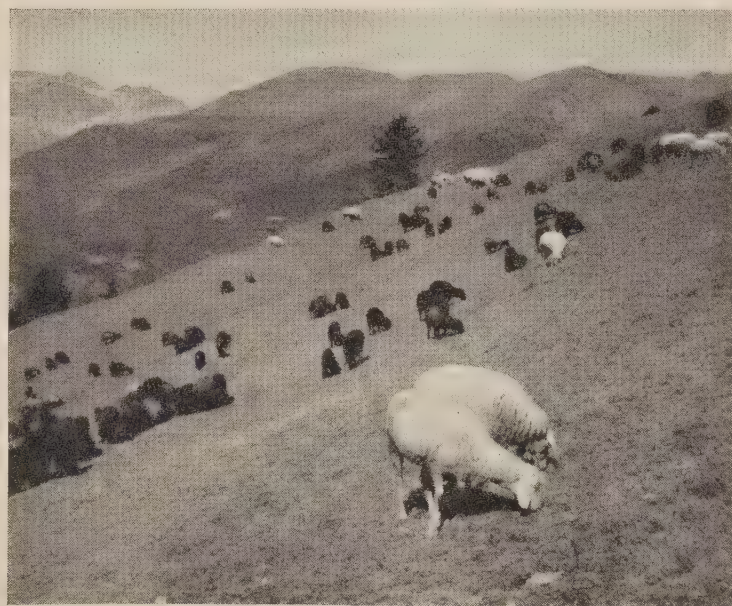
as: *Potentilla* spp., *Primula* spp., *Erigeron* spp., *Veronica* spp., *Saxifraga* spp., *Hypericum* spp., *Campanula* spp., *Leontodon* spp. and *Rumex* spp.

2. The dry meadows in good condition are characterized by such species as: redtop—*Agrostis alba*, *A. canina*; bluegrass—*Poa pratensis*, *P. palustris*, *P. violacea*, *P. bulbosa*, *P. compressa*; Junegrass—*Koeleria Cristata*; fescues—*Festuca ovina*, *F. laxa*, *F. silvatica*; brome-grasses—*Bromus inermis*, *B. erectus*; timothy—*Phleum pratense*; orchardgrass—*Dactylis glomerata*; wheat-grasses—*Agropyron caninum*, *A. Junceum*, *A. repens*; such legumes as *Trifolium alpinum*, *T. campestre*, *T. badium*, *Lotus corniculatus*, *Anthyllis montana*, *A. hypoglottis*, *Astragalus montanus*, *Lathyrus montanus*, *L. vernus*, *Vicia silvatica*, *V. dumetorum*; and such weeds as *Geranium* spp., *Achillea macrophylla*, *A. atrata*, *A. millefolium*, *Daucus Carota*, *Tenacetum* spp., *Erigeron* spp., *Potentilla* spp., *Cirsium* spp., *Euphorbia* spp.; such woody plants as *Artemisia* spp., *Arctostaphylos* spp.

3. Grass-timber meadow types are located chiefly on slopes where the grazable forage may appear in parklike areas between clumps of trees or beneath a scattered tree overstory. Pastures in good condition in this forage type are characterized by such species as the bromes—*Bromus erectus*, *B. inermis*; the wheatgrass—*Agropyron caninum*; ryegrass—*Lolium multiflorum*; wild ryegrass—*Elymus Europaeus*; wild fescue—*Festuca silvatica*; bluegrasses—*Poa compressa*, *P. cenisia*, *P. violacea*, *P. alpina*; oatgrasses—*Avena pubescens*, *A. versicolor*, *A. montana*, *Trisetum*

argenteum; reedgrasses—*Calamagrostis villosa*, *C. tenella*; meadow foxtail—*Alopecurus Gerardi*; needlegrass—*Stipa capillata*; such legumes as *Trifolium montanum*, *T. alpestre*, *T. spadiceum*, *Astragalus excapus*, *A. alpinus*; such weeds as *Carum Carvi*, *Hieracium* spp., *Chrysanthemum* spp., *Veratrum* spp., *Aconitum* spp., *Polygonum* spp.; and such woody species as *Salix* spp., *Juniperus communis* and *Vaccinium uliginosum*.

Erosion on the wet-meadow type pastures generally consists of gullies, originating from stock trails, from overused night corrals, from excessive trampling around springs and watering troughs, and from slips of considerable size on the sides or rims of the basins or valleys. Injury is generally localized. Slips are caused chiefly by deep-cut stock trails or roads running across the toes of steep slopes or pitches when the soil is comparatively shallow or where it rests on a natural slip plane of rock, impervious clay, schist, or serpentine. Sheet erosion does occur, when there is overgrazing late in the season, from the snow melt of early spring. It does not occur from too early grazing or from overgrazing on pastures which are in fair or better condition provided some forage regrowth is permitted before the snows come. Evidence of sheet erosion on the wet-meadow type is most apparent on those pastures near old settlements or towns, or near very old farmsteads where long continued and late grazing has permitted recurring surface erosion over an extended



Wet-meadow forage type; fair to good condition. Slope is steep on side of narrow valley. Forage species are those characteristically found on basins and valley bottoms. This meadow, temporarily grazed too closely, has generally been properly grazed.

period of time. Such areas are easily identified by the presence of various-sized rocks and cobblestones lying on the surface of the ground. Such stones generally exhibit sharp surfaces, showing little evidence of long exposure; in extreme instances such rocks may literally cover the surface.

Remedial measures involve, in addition to the application of good grazing practices, temporary non-use of eroding areas, reseeding and replanting areas of exposed soil, development of properly located stock-water facilities to eliminate excessive traveling and trampling by livestock, realignment of trails and roads away from the toes of hazardous slopes, and in some instances the removal of stones from the surface. The removal of surface stone, however, is not an economical practice except where the soil is deep or where it is desired to harvest hay from the meadow, or where the stones are exceedingly numerous and they can be disposed of with short hauls. One example of an economically successful disposal of surface stone was observed where the water-spreading system for the meadows consisted of a series of fanlike trenches to spread irrigation water. These trenches were filled with nearby surface stones, then covered by the soil taken from the ditches.

Erosion on the dry-meadow type mountain pasture characteristically is much more severe than on the wet-meadow types. It is seen in its most severe forms on mountain pastures in the Central Appenine Mountains. Many of the pastures at elevations of 1,300 to 1,600 meters are basins or round valleys with surrounding steep-sided ridges rising 300 to 600 meters above the basin or valley floor. Here extensive areas of the pastures are subject to mud, sand, and gravel overflows that may form fans of 5 to 25 hectares in extent; or, if the gradient of the pasture is steep, deep-cut gullies are gouged out from the toe of the slope to the outlet of the valley or basin, where the wash from the surrounding ridges is carried across the meadow and dumped on lower-lying land. Topsoil losses on pastures long overgrazed are severe both from spring runoff following the snow melt, which is usually during the time frost is leaving the ground, and from winds which occur during the hot part of the summer and early fall. High winds may occur frequently during the latter part of the season. The dry-meadow types

are frequently on open, porous soils, so that when the vegetal cover is reduced by misuse and the protecting organic materials of the soil surface are carried away, valuable plant food elements are leached downward by the rapid percolation of soil moisture. On some dry-meadow types, where the substrata consist of limestone formations, excessive percolation of topsoil moisture has dissolved the underlying strata and extensive sinks have resulted. Areas varying in size from a few square meters to several hectares have dropped 1 to 6 meters. Such sinks are generally covered with soil on the sides and bottom. The mountain pasture "Campo Felice", some 300 hectares, located 25 kilometers south of Aquila in the Province of Abruzzo, is an example of a pasture where such phenomena are occurring.

Remedial measures and practices to control and prevent erosion on dry-meadow type pastures include, in addition to the adoption of sound grazing practices, development of livestock water supplies, and the accumulation of plant and organic residues on the surface of the soil. Maintenance of adequate vegetal cover through the dry summer months prevents excessive evaporation and wind erosion, and reduces over winter the effects of frost and spring runoff. Reseeding and fertilizing of depleted areas, and total exclusion of livestock from the surrounding steep ridges and mountain sides, are important measures if permanent improvement of such eroding meadows is to be successful.

Erosion on the grass-timber types is ordinarily not severe. But as this type generally is found on long slopes of moderate to steep gradient, there are some pastures that have been subjected to long continued abuse and misuse where practically all of the topsoil except that held in place by tree roots has been eroded away; the trees have the appearance of growing on mounds or pedestals. Generally, in this forage type, the erosion pattern is that of small gullies and numerous rills arranged fanwise, funneling into lower depressions and drainageways.

Remedial measures, in addition to the application of good grazing practices, include actions to build up plant residues and organic matter, reseeding and replanting denuded and depleted areas, development of livestock water facilities to reduce travel and trailing of the stock, and the careful placement and frequent moving of night corrals.



Hart hauls cottonseed hulls to his farm and works them into the soil to improve fertility. Some of his dairy cows are seen here working over a pile of hulls just brought from gin.

WAR VET TRANSFORMS FARM

By JAMES E. WRIGHT

ALLEN HART was working on ranches in Arizona because he liked livestock. Then came the war. After 3 years with the Army Air Corps in China, Burma, India, Ceylon, and other places, Hart was discharged in September 1945.

He came back to Arizona with some ready cash and a feeling of extreme restlessness. As he puts it, "I realized that there was just one thing to do, in a hurry—buy a place that would tie my money up, and tie me down. That didn't leave much time for shopping around, so I bought just about the first farm I found for sale."

Hart's farm is in the lower Safford Valley, where considerable land is hardly suitable for irrigation. The soil is tight and usually contains salt or alkali. His 40 acres were barely above marginal.

Since the war veteran's main interest was livestock, he immediately set about to improve his pastures. The Gila Valley Soil Conservation District annually sponsors a buying pool for grass and legume seed, so Hart contacted the district

supervisors about plans for improving his pastures.

"You see, I'm not a farmer," he told district supervisors. "I even had to ask the former owner how close together to cut openings in the ditch bank when I wanted to irrigate.

"And you should have heard the answer. The former owner said we'd not have to cut the bank at all as there were enough gopher holes to let out all the water. And he certainly was right. The water ran everywhere, even under the house."

The outcome of Hart's talk with the supervisors was the decision to put a complete soil and water conservation program on his farm. Soil Conservation Service technicians working with the district helped plan his program, which provided for pasture reseeding, soil fertility improvement, and a more efficient irrigation system.

The farm was planted to barley when Hart became the owner in the summer of 1946. He found that part of the crop wasn't worth combining, and the portion that was harvested barely paid the cost of the work.

The years 1946 to 1948 were considered drought years, even in the arid Southwest. The Gila River provided little water toward the latter part of

NOTE.—The author is conservation aid, Soil Conservation Service, Safford, Ariz.

this period. Wells from which supplemental irrigation water was pumped gradually weakened and many failed entirely.

But Hart stuck to carrying out his conservation plan. He improved his irrigation system and worked constantly to increase fertility. Because of the unusual soil conditions, Hart and the technicians experimented with pasture grass mixtures, some of which were successful. This hard work soon paid dividends.

In 1946 Hart sold only 151 pounds of butterfat. In 1947 he sold 453 pounds. He also sold 1,195 gallons of whole milk. The following year he marketed 2,338 gallons of milk and 6,015 pounds of beef. Another 4,675 pounds of beef were sold during the spring of 1949, as well as other products on which records are not available.

Income statistics are interesting in view of the farm's history before Hart became the owner. Any one of the numerous animals sold by him certainly had a greater market value than the entire barley crop he found on the place.

As an irrigated farm, Hart's is unusual in many ways. He hasn't planted a cash crop since he became owner. The only permanent fences are those on the property lines. The entire income is from dairy and beef cattle, and chickens. Enough hogs are raised to provide meat for the family.

"We try to make the milk cows and chickens meet current living expenses, but not all the products get off the farm," Hart pointed out as he indicated a refrigerator packed with butter, cream, milk, eggs, and dressed chickens. Certainly Thelma, his wife, and Cerenne, their 16-year-old daughter, show no signs of malnutrition.

"While the livestock keeps a fellow around fairly close, I find time for other things," Hart declared. "During the cotton ginning season I haul cottonseed hulls from the gin to my fields. These loosen the soil and improve the fertility. One year when water was short, my yearlings were not ready to sell at marketing time, so I had to hold them a few months. In order to tide us over, we went out and picked cotton for the neighbors."

When the Harts have carried out their conservation plans their farm will not resemble the one they bought. It has taken time for them to rebuild it to its present condition and it now provides feed for 25 to 30 cows a year. Hart feels that, during favorable years, his 40 acres eventually can be put in condition to produce the feed needed for 60 head of cattle. The soil on his farm may not be capable of producing that amount of feed, but there is little doubt that he will attain his goal before long.

THE LOMPOC VALLEY RESPONDS TO IRRIGATION

By **HERB BODDY**

LAND transformations in California's Lompoc Valley are today running a close second for top billing to that State's world-famed "Oasis of Flowers." The new show window of conservation farming in Santa Barbara County centers in 1,500 acres of smoothed-down land, leveled by farmers for irrigation.

Ironing out farm-land hummocks and low spots is the first step in the irrigation program of the Lompoc Soil Conservation District, designed to bring water to thirsty crops. The investment farmers are putting in land leveling is already netting good gains in increased crop yields and higher farm incomes.

Dry-land crop production in the Lompoc com-

munity has dropped off sharply in recent years. Rainy seasons have been of shorter duration. Even dry-land farmers, accustomed to getting along with little moisture, have found that growing crops on parched, dust-dry acres, year after year, is a losing battle.

Good crop yields are reported sometimes by dry-land farmers during times of above-average rainfall. But of late many landowners have despaired of farming their tinder-dry soils. On short water rations, their hay, grain, and bean crops have been bringing only token returns.

In 1948 and 1949 more and more of the valley's landowners and tenant farmers changed over to irrigation to make their farms pay. Farmers who tapped well-stocked underground reservoirs had one of their best crop harvests in years. Irriga-



One of the smaller leveled fields on the Lewis farm which was seeded to oats and vetch for immediate cover. Residues will be left undisturbed to provide mulch and seed for natural reseeding.

tion is also making it easier to cash in on the profitable vegetable markets in Santa Barbara, San Francisco, and Los Angeles.

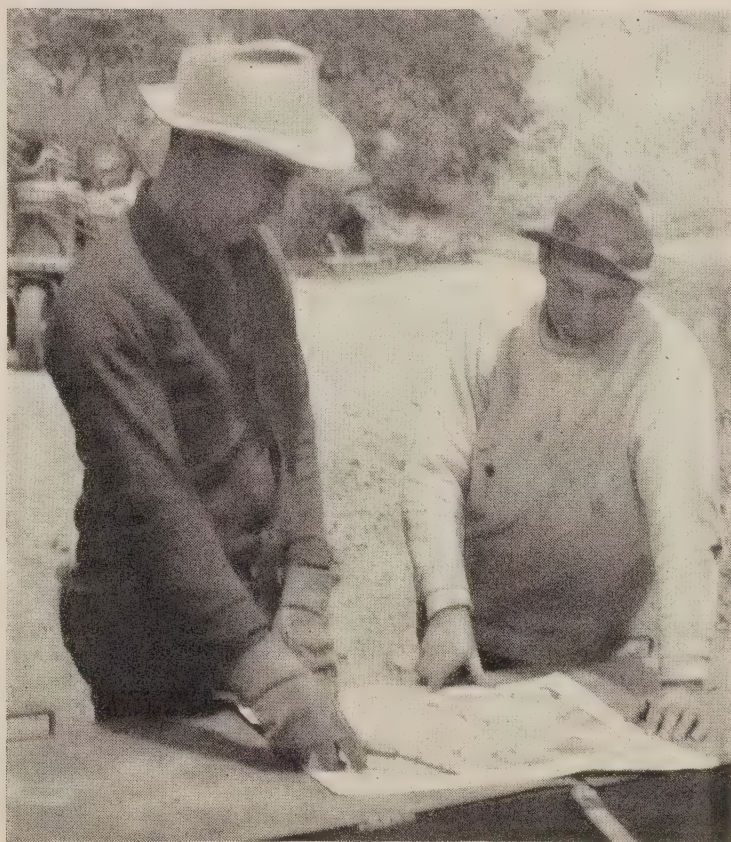
Lompoc's low rainfall belt has long baffled row croppers. It wasn't until farmers voted to put more than 208,000 acres in the Lompoc Valley in a soil conservation district that they began to get full use from their acres.

On the Lompoc farm scene today it's common to see heavy land-leveling equipment at work skimming off hummocks and filling swales.

Two Lompoc farmers, John and Ralph Lewis, who figure to gain by leveling their lands, echo the sentiment of the community's district cooperators.

Says John, "It wasn't so many years ago that we farmers had to be content with the way Nature made our lands. If our acres were rough, we farmed them the best way we could. Now times have changed! Today, almost any dry-land farmer can do a face-lifting job on his land, with modern land-moving equipment and technical help from the Soil Conservation Service. That's why so many of Lompoc's veteran dry-land ranchers are switching over to irrigation."

The Lewis brothers have dry-farmed 190 acres, 4 miles east of Lompoc on the Santa Ynez River, since 1928. The 90 acres they leveled for irrigation in the spring of 1948 was the key to their bumper row-crop harvest.



The Lewis brothers check their conservation plan before each step in their program.

For years the Lewises stood the uncertainty of the seasonal rainfall with grim forbearance. During heavy rainfall years, their hay, grain, and bean crop harvest was good. But four sacks of



One of the Lewis fields while being irrigated. The brothers expect to double bean production and to cash in on a profitable truck-crop market.



John and Ralph Lewis have worked out a job-priority routine; here they fill a fertilizer distributor.

beans per acre and one crop a season was the best they could get in other years.

"After harvesting the 1947 crop, there was hardly enough left for a church mouse," John mused. "Then we joined the Lompoc district. Our fortunes improved from that day. Conservation farming changed our production from one crop a season to five crops in 3 years."

The Lewis brothers sought the aid of the district directors to save their farm. Like many landowners eager to remake their farms, they needed engineering help. The directors obtained technical assistance for them from the SCS staff.

It would have been difficult for the average farmer to lay out the Lewis acreage for land-leveling work. Some swales were 6 feet deep and there was a deep gully running across one field.

When the technicians surveyed the 90 acres, the Lewis brothers worked side by side with them. Putting a field in shape for irrigation isn't just a matter of flattening the land. The land must have a slight grade so that the furrow system will flow evenly. Irrigation-runs over the fields must not be too long nor too short and water-distribution lines must be the right size and properly located.

Halfway through the leveling work, a bulldozer operator uncovered an Indian burial ground, including the remains of three tribal members, earthenware, and hunting implements. Many more graves were uncovered, but only three were intact. The find is now part of the collection of Clarence Ruth, Lompoc curator.

The land-leveling work was completed late last

spring, after 87,509 cubic yards of soil had been moved. The new system includes a permanent pipe line, wellspring, and pumping plant. Water at the rate of 1,200 gallons per minute is on tap for crops. The Lewises follow a fertilization program to enrich some of the more deeply cut sections of their field.

A quick glance at the returns shows top crop

yields unheard of before on the ranch. The Lewis brothers expect to double bean output over what they have known in average dry-land farming. Soil-building green-manure crops can now be grown. Land value has increased manifold.

The Lompoc district reports that more than 3,000 acres were leveled for irrigation by farmer-cooperators last year.

CHURCHES THRIVE AS LAND PROSPERS



CONSERVATION of the soil gets to be an attitude that carries over into saving other things as well, the Reverend Garland Stafford of Lewisville, N. C., told North Carolina soil conservation district supervisors at the annual meeting of their State association at Burlington.

"A man may begin by saving soil to make money," the speaker said. "It will do that. And it will do something fine for his outlook on life and his stability as well. I have yet to see a conservation farmer who was not congenial with the ideals and aims of the church, nor one who did not look with confidence to the future of his farming operations."

"It has been noticeable that workers in conservation services and organizations have gone about their work with a passion compelled by a seeming sense of the overwhelming and fundamental importance of what they were doing for all life. The atmosphere in conservation is Christian."

Rev. Mr. Stafford, who is chairman of the Commission on Town and Country Work of the Western North Carolina Conference of the Methodist Church, pointed out that rural churches are recognizing the importance of soil conservation to them and are helping the movement along.

"It may be considered axiomatic," he said, "that farm communities that save soil save their churches and save their people spiritually."

Referring to a study of 222 rural Methodist churches made several years ago by Dr. T. S. Buie, southeastern regional director of the Soil Conser-

vation Service, which showed a direct relation between the degree of erosion and the state of the church in a given community, he said:

"That the degree of soil erosion seems to have more effect on the vitality of a church than its denominational affiliation, doctrinal beliefs, form of church government, or history of pastoral oversight is significant."

"The principal reason for abandoned churches is abandoned homesteads. Church administrators have viewed with more alarm the death of churches than the disease that produced the fatalities. The church must courageously warn of the cultural and moral decay that follows the destruction of soils and other resources."

NOTES FROM THE DISTRICTS

VETERANS ON THE LAND.—Conservation farming, in cooperation with the West Fork (W. Va.) Soil Conservation District, has enabled 118 World War II veterans enrolled in a GI agricultural training course to make outstanding progress through the investment of more than a half million dollars in the purchase and improvement of Gilmer County farm land.

Sixty-eight percent of these vets own farms that average 132 acres. Thirty-six have purchased farms since they entered the cooperative program. Soil conservation practices established include 974 acres of meadow seeded, 326 acres of strip cropping, 8,590 feet of diversion ditches, 38,317 trees planted, 22,050 multiflora roses set for fences, 50 acres of cover crops, 150 acres of nurse crops, and 16,636 rods of new fence.

BEEF GAINS.—Sixty head of steers have helped a Greenbrier, W. Va., farmer and his three sons get better pasture building courses. G. S. McKeever and his sons, Vincent, Ivan, and Ray, jointly bought the steers and divided them into three approximately equal lots. These were the results at time of sale, after 28 days on pasture.

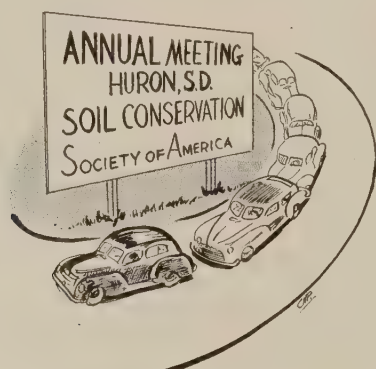
The elder McKeever's steers, pastured on native grass, partly treated but not mowed, made an average gain of 14 pounds.

Ray used native grass pasture, partly treated and partly mowed. His steers made an average gain of 22 pounds.

Ivan and Vincent's steers, pastured mostly on Ladino and orchardgrass, treated and mowed, gained an average 76 pounds.

At 30 cents per pound, the gain for 28 days would be \$4.20 per head, or \$84, for the elder McKeever's steers; \$6.60 per head, or \$132, for Ray's steers; and \$22.80 per head, or \$456, for Ivan and Vincent's steers.

Two other factors had a part in results. The steers of Ivan and Vincent had a better water supply than those of their father. His herd was driven to the barn lot, loaded on trucks, hauled 2 miles to scales, unloaded and weighed. Ray's steers were driven 2 miles before they were weighed. The steers of Ivan and Vincent were driven a short distance from pasture to scales. There is more driftage when they are driven to trucks, and loaded and unloaded before weighing.



WELL WORTH ATTENDING.—History was made at the annual meeting of the Huron, S. Dak., Chapter of the Soil Conservation Society of America, in February. Ninety-five employees of the Soil Conservation Service who are members of the State chapter attended entirely at their own expense, for the purpose of self-improvement. The employees came in groups and used personal cars, none being on a per diem basis or entailing Government travel expense. The large representation, drawn from many parts of the State, reflected the eagerness of SCS personnel to become more capable in soil conservation science and technique—and to pay for this improvement themselves.

SILO RING TROUGH.—When Marsden Bacon, Middletown, Conn., farmer was pouring a concrete silo, he sent workmen to a pasture, close to his new farm pond, to build a good watering trough. They put in a foundation and built one silo ring, 14 feet in diameter and 2 feet

deep. The water supply is piped from the pond. A float valve is located in the center, where the cows can't get to it. A plug for drainage is in the bottom. Now all his cows can drink at one time, whenever they want to.

YEAR OF ACCOMPLISHMENT.—Supervisors of the Conecuh River (Ala.) Soil Conservation District report a large increase in application of soil and water conservation practices during 1949. Increases were especially notable in the planting of perennial and reseeding annual legumes as indicated below:

Practice applied	1948	1949	Increase
	<i>Acres</i>	<i>Acres</i>	<i>Percent</i>
Sericea.....	1,943	3,350	72.4
Kudzu.....	873	1,252	43.4
Caley-peas.....	2,609	6,510	149.5
Crimson clover.....	1,157	8,630	645.9
Tall fescue and clover.....	596	1,960	228.9
Lupine.....	35,000	73,000	108.6
Terraces.....	10,060	12,540	24.7
Fish ponds (number).....	28	53	89.3

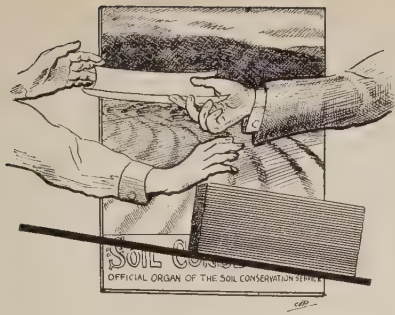
In addition, farmers cooperating with the district harvested 3½ million pounds of blue lupine seed and 100,000 pounds of combine-run sericea seed in 1949. This is almost double the amount harvested in the district during any year previously. All agencies helped to get the job done.

Ninety-four percent of the fescue and clover mixture, 76 percent of the crimson clover, 70 percent of the Caley-peas, and 53 percent of the lupine planted in the district were on cooperators' farms. All of the sericea seed and 75 percent of the lupine seed harvested came off cooperators' farms. All the sericea and kudzu planted and all the terraces and fish ponds built were also on cooperators' farms.

SCS technicians helped farmers to plan 509 farms, covering 50,962 acres.

THIRTY NEW READERS.—The First National Bank of Elmer, N. J., has entered 1-year subscriptions to SOIL CONSERVATION Magazine for 30 Salem County farmers cooperating with the South Jersey (N. J.) Soil Conservation District. The bank regards this as an investment in improved agriculture which will further the prosperity of the community.

HOME OF OWN.—At least one soil conservation district will soon have its own building. At Bedford, Iowa, Merle Travis, Wayland Livingston, and Charles Wintermute, Taylor County district commissioners, have begun work on the building on the district's own lot which was purchased last summer. A garage has already been built.



MAGAZINES FOR SCHOOLS.—Supervisors of the Black Belt Soil Conservation District in Alabama voted at their January meeting to give each school in the district a year's subscription to SOIL CONSERVATION Magazine.

HANDY REFERENCE.—The Wabasha County (Minn.) superintendent of schools requested "Kits for Rural Teachers" to be distributed to all teachers in the county. Interest developed at a workshop sponsored by the Winona State Teachers College. Similar kits may be distributed to Goodhue and Dakota County teachers. Kits supplied last year to 35 rural school teachers in Goodhue County proved very effective.

POND PAYS OFF.—A \$330 farm pond, holding 65,000 gallons of water, saved a \$15,000 barn with contents, a \$7,500 implement shed with contents, and a milk house belonging to John Fitzgerald, Chenango County supervisor, near Oxford, N. Y. Firemen, traveling 3 miles from Oxford, after a long delay in getting the alarm, arrived too late to prevent destruction of the Fitzgerald house. "Without the pond," Fitzgerald says, "I would have lost everything but my land."

NEGRO STUDENTS IN CONTEST.—Thirty Negro high-school students from the Halifax County work unit in the Tar River (N. C.) Soil Conservation District have entered the soil conservation speaking contest sponsored by the North Carolina Bankers Association. The students along with the Negro county agent were taken on a tour to observe the needs for soil conservation and to a farm that had applied all soil and water conservation practices recommended by the Soil Conservation Service.

SCHOOLS SUPPLIED.—The East Fillmore (Minn.) Soil Conservation District is giving a year's subscription to SOIL CONSERVATION Magazine to each of the district's seven village school systems. In announcing the gift, the supervisors expressed the hope that the magazine would be kept in the libraries where all pupils will have access to it.

REVIEWS

PASTURES.—By Richard Y. Bailey, Robert R. Lancaster, Edwin James, and Roland R. Harris. Edited by Paul W. Chapman. Turner E. Smith & Co., 441 West Peachtree Street, Atlanta, Ga. 500 pp. 189 Illustrations. \$2.96.

"Pastures" is a product of excellent editing as well as sound and readable writing. It is physically inviting, easy on the eyes, convenient to handle. Furthermore, and here too is the mark of good editing, the book is up-to-the-minute in its content—a quality all too rare in the textbook field. There's no dust on its pages.

Feed forage means grass, hay, grass silage. That's what the book "Pastures" is about.

As Dr. Clarence Poe says in the introduction, this book points the way to a two-armed type of farming, crops, and livestock—a system that provides income-producing work on an all-year basis, rather than for just 6 months; a system of farming that conserves the soil; a system under which yields become increasingly larger and more profitable.

Mass progress waits upon mass understanding of the advantages of conservation or grassland farming. To aid in carrying this message, "Pastures" was written.

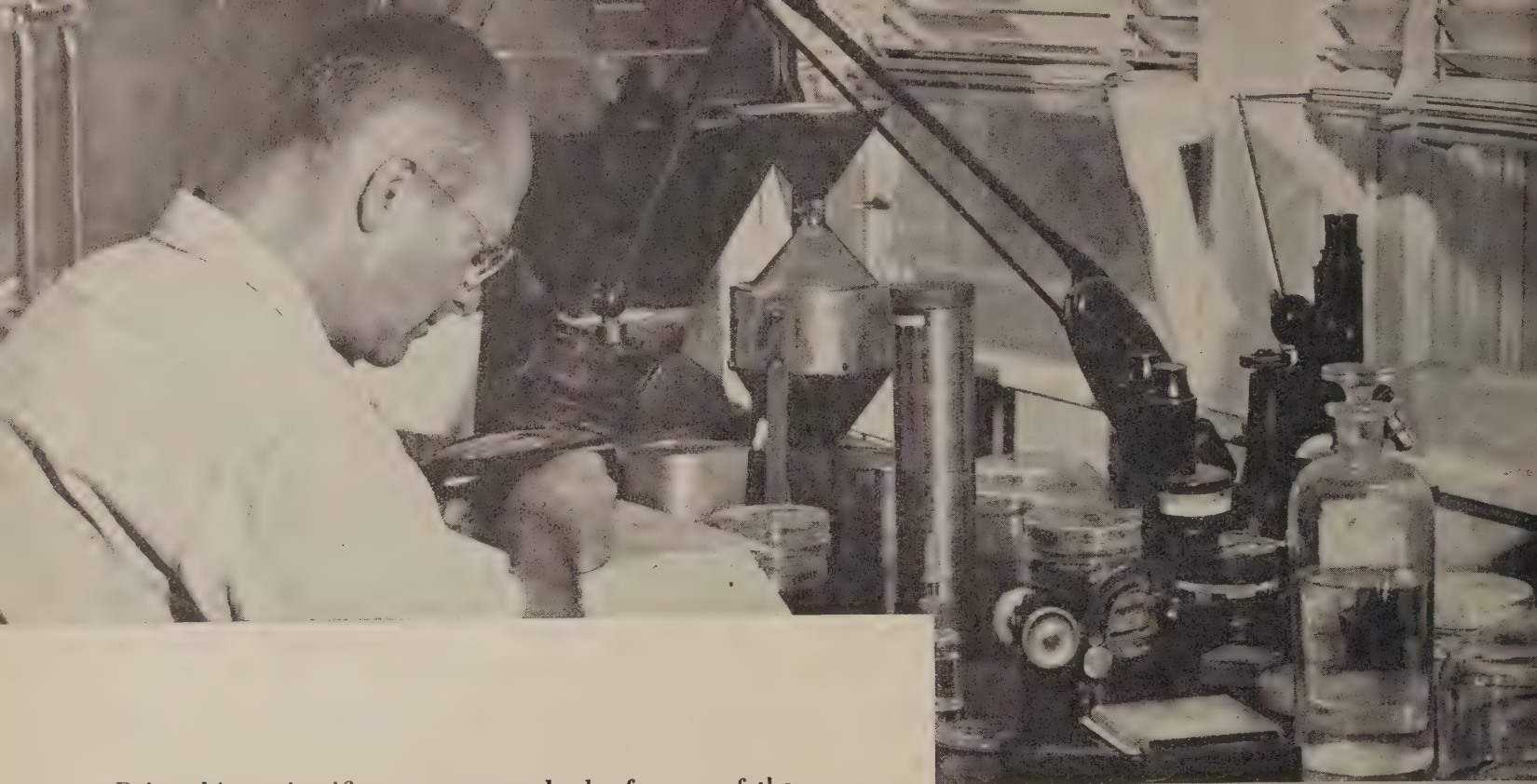
The book is written in simple words and easy sentences. It is a story-telling book. It tells stories of the grassland achievements of farmers; it reports the work of experiment stations. It is well organized. Designed as a textbook, it is also a handbook of information—a farmer's guide.

Aimed at all-year grazing it deals with permanent and temporary pastures. Some of the chapter titles: *Farming With Grass, Forage Plants, All-Year Grazing Systems, Permanent Pastures, Grazing From Cropland, Winter Grazing, Summer Grazing, Grass Silage, Quality Hay.*

The authors include four widely known specialists: R. Y. Bailey, chief agronomist, Soil Conservation Service, Southeastern Region; Robert R. Lancaster, pasture specialist, Extension Service, A. & M. College, Texas; Edwin James, forage crop specialist, USDA; and Roland Harris, agricultural engineer with the University of Georgia.

GOOD ROADS QUELL FLAMES.—When W. E. Potter, Jersey Mountain, W. Va., farmer, and SCS technicians made plans for a new farm pond, they included two good roads as approaches. This idea paid off in February 1950 when a three-story cave and storage caught fire. Flames threatened to destroy the structure until the Romney firemen arrived and hooked their pumps to the pond and quickly put out the fire after only \$500 damage. Potter is a cooperator with the Potomac Valley Soil Conservation District.

At the beginning of 1950 there were 2,196 soil conservation districts in the United States being assisted by the Soil Conservation Service.



Painstaking scientific processes are back of many of the remarkable achievements in stabilizing and improving western range and farm lands. Two of these processes are depicted in the pictures here, showing E. O. Brown, seed analyst, at work in the Soil Conservation Service nursery laboratory at San Antonio, Tex.

In "purity analysis" (above) a large sample of grass seed is broken into working samples by the cone-shaped separator, then cleaned by sieves or blower. Actual purity count is by hand, grass seeds being separated from "foreign" matter—crop seeds, weed seeds, inert material. Percentage of purity is determined by weight.

In "germination tests" (below), samples of about 400 seeds each are planted in moistened substrate and placed in germination ovens. To simulate the natural weather cycle, the samples are shifted from warm ovens to cool ovens at intervals. Freshly harvested seed of certain species is quite dormant, a condition which is broken by imposing freezing temperatures before placing samples in germination ovens. Percentage of germination is determined by actual count of sprouted seeds.





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WASHINGTON, D. C.

☆ THIS MONTH ☆

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

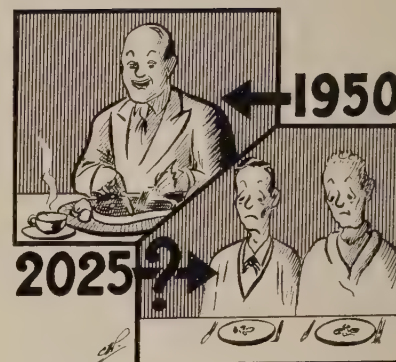
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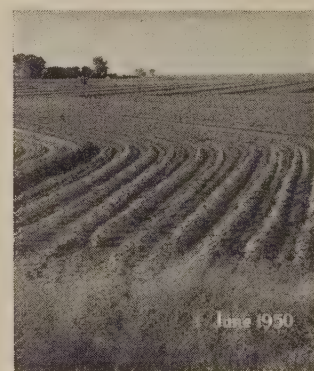
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SCHOOL ADMINISTRATOR LOOKS AHEAD.—Willard E. Goslin, Pasadena, Calif., superintendent of schools, before the National Association of Secondary School Principals at Kansas City, Mo., advocated a school in which conservation, democracy, and peace will have top attention. "By 2025," he said, "about two Americans will be where one is now. If something isn't done, they are going to have a hard time eating." He told fellow educators, "You and I will be able to live out our lives, in the main, in a land of plenty, but unless you folks stir yourselves and realize the importance of emphasizing conservation, there will be more hungry people in the American generation to come than can produce the kind of citizens we must have to survive."



FRONT COVER.—This is how border irrigation of cotton is seen on the farm of Henry Derham of the Toyah-Limpia Soil Conservation District, Balmorhea, Tex. Borders have very slight slope, with side-slopes removed. Photo by Ben Osborn.

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DISTRICT PROFILE

DAVIS
of
TEXAS

When the National Association of Soil Conservation Districts picked Waters S. Davis, Jr., of Texas as its 1950 president, it turned its steering wheel over to a man who believes the salvation of agriculture lies in soil conservation as carried on through soil conservation districts.

For the past 6 years, whenever he has been able to get a listener, Waters Davis has talked conservation of soil resources and good land management. Using the land for the use to which it is best suited is a part of his creed. Giving it the treatment it needs and operating it in a way to keep it permanently useful is the rest of it.

He believes the only way to get permanent soil and water conservation on the land is through the democratically organized and operated soil conservation districts. By doing the job through the districts, Davis is convinced that the responsibility for conserving the land is where it should be—in the hands of the landowners and operators themselves.

To Davis, as to many other livestockmen, putting the land to its best use is certain to mean a lot of good pasture. In most parts of the country that means grass, and Davis is convinced that some of the Nation's agricultural problems would be much less troublesome if a few million acres of land now growing poor crops were put in good grass.

Not long ago when a fat steer that had eaten \$700 worth of sack-feed won top prize money in a Texas stock show, Davis blew his top. The Texas livestock industry, he argued, was missing a bet when it failed to encourage better recognition of the State's most important crop—grass. Davis decided that it was time for Texas youth to begin learning about grass and that one way to start was for the Association of Texas Soil Conservation District Supervisors, of which he is president, to sponsor grass-judging contests at local fairs and at all the big stock shows. The idea caught on and has spread rapidly to other States.

Waters Davis got his first taste of soil conservation district work in 1944 when he volunteered



Waters S. Davis, Jr.

to run for district supervisor "because I felt sorry for the fellow who asked me after he'd been turned down by nine other men."

Davis was elected, but if you'd told him then that 6 years later he would head the National Association, be president-manager of the Texas association, editor of the association's *Texas Topsoil*, chairman of the Brazoria-Galveston Soil Conservation District Board of Supervisors, and a member of a dozen or so other agricultural organizations, he probably would have cracked, "Bud, you've got a loose connection somewhere."

Besides his official duties in soil conservation district organizations, which require him to travel widely and take an increasing amount of his time, Davis could probably win the prize for cooperating with the largest number of districts as a landowner. He is an active cooperator with the Brazoria-Galveston, McLennan County, Wichita-Brazos, and Lower Trinity Soil Conservation Districts.

Davis is mighty proud of the way his own cattle have progressed since he started to improve the grasses on his range land. The calf crop on his

League City ranch, his home and headquarters, topped the market at Houston five times in a row, and calves on his Waco ranch improved from a 70-percent crop and 425-pound weights in 1944 to 91.6 percent and 535 pounds in 1948.

Waters Davis was born at Galveston in 1899. He graduated from Hotchkiss School, Lakeville, Conn., and Williams College, Williamstown, Mass. "My major was German literature, so help me," he quips.

He lived in the east until 1940, but was interested in Texas agriculture all this time and made frequent visits to his home State. He took over the League City ranch in 1940 when he returned to his native State to live.

Telling how he got into soil conservation district work 4 years later, Davis relates: "Back in the spring of 1944, I came out of the barnyard the wrong way. I should have gone out around the back and taken a 20-mile detour to the house. It

would have been time and energy saved. Walking toward me was a very innocent looking gent, Morris Vieman, the Galveston county agent. 'Waters,' says he, with an air of handing me a piece of candy or a fresh plug of Tinsley's Thick, 'this Brazoria-Galveston Soil Conservation District has been voted through and it needs a good man to run for supervisor.' "

That was the beginning of Davis' work for soil conservation districts which has seen him elected to top jobs in the national, State, and local organizations.

And though he says roughly that "I don't want to be midwife to any more soil conservation districts," his friends know that Waters Davis recognizes the importance of his job and will stick to it as long as there is soil conservation work to be done.

—TARLETON A. JENKINS.

AWARDS FOR GOOD DISTRICT ADMINISTRATION

AN outstanding example of industry cooperation with soil conservation district governing bodies is the annual project sponsored by the Good-year Tire & Rubber Co. to encourage good district administration.

This is the third consecutive year in the States of Illinois, Indiana, Iowa, Michigan, Missouri, Minnesota, Ohio, and Wisconsin.

The current contest runs from July 1, 1949, to June 30, 1950. Each State's winning district governing body, together with the district's three outstanding farmers, will be taken on a 7-day vacation trip to the company's farms at Litchfield Park, Ariz.

The award trip will be packed with recreation, sightseeing, and companionship with farmers from other States. Three days will be spent at the farms. A complete cowboy outfit—shirt, pants, and a "10-gallon hat"—will be issued to each guest to get him into the true "western spirit." All the luxuries of the Wigwam, an outstanding winter resort, will be included: Golf, swimming, rodeos, and desert tours; inspection of methods pertaining to growing cotton, raising range cattle, irrigation, and other activities in Arizona's Salt River Valley.

The score sheet used by the districts to judge their own activities is divided into four main parts:

1. Administration.
2. Speeding present and future work.
3. Conservation planning.
4. Conservation accomplishments on the land.

At the close of the program, the districts will submit the score sheet to a State judging committee appointed by the State conservation committee. This committee completes the job by scoring the districts on the following:

5. Program development and plan of undertaking.
6. Additional factors. Judges use this section as they see fit to compensate for such factors as difference in personnel assisting the district, equipment available, etc.

This year an aid has been added for use in selecting a district's three outstanding farmers. The "accomplishment sheet" enables farmers and cooperators to judge their own efforts during the year.

There has been a big increase in the number of



Shown watching a rodeo in Arizona in 1948 are these farmers and district officers who were among the winners that year. Hands on rail, in center, is P. W. Litchfield, board chairman of the sponsoring company.

participating districts as a result of this accomplishment sheet.

The score sheet supplies to the districts a guide to carry on their daily task of management. It helps to develop a strong organization, able to direct proper land management and the correct application of soil conservation methods.

During August and September, Goodyear will hold a series of recognition luncheons in centrally located cities in each of the eight States honoring winning districts and farmers.

Cooperating in the program are district governing bodies, the Extension Service, the Soil Conservation Service, and the State judging committees.

WILD-TURKEY PASTURE.—Even wild turkeys relish Suiter's grass (Kentucky 31 fescue) pasture, says John B. Hungerford, SCS technician of Waycross, Ga.

Early in January, when Hungerford and Simon Krock were walking over Sapelo Island, they saw 28 wild turkeys

grazing on a newly established fescue-white clover pasture. They investigated.

No cattle had access to the pasture, yet it was grazed heavily. The white clover had been passed over. The turkeys preferred fescue.

The two men learned that the flock of turkeys had grazed the fescue pasture for more than a month, feeding on it almost every day. The birds had grazed an adjoining field of oats lightly and only for very short periods, obviously preferring the fescue.

Aware of the possibility of using fescue for wildlife pasture on low-lying lands, Verne Davison, SCS biologist, had several observational fescue plantings made exclusively for wildlife—deer, wild ducks, wild geese, and wild turkeys. Davison explained that the best way to find out if the perennial wetland-loving grass is suitable for wildlife forage is to try it out and see.

A second planting, recommended by Davison for winter wild-turkey pasturage, was being used by the turkeys daily through December and January. Kit Shaffer, Virginia Game Commission technician, reports this encouraging use of Kentucky fescue on their game food pastures in the Cumberland State Forest, located in central Virginia.

THIS FARM POND STOPPED A FIRE

By WELLINGTON BRINK

MOUNT Prospect Farm, which lies a little north of Travilah, Md., in the Potomac hunt country, is famed as a fine demonstration of soil conservation operations. Owned by William C. Hanson, a refugee from city life, it has been visited by hundreds of farmers, students, agricultural experts, and even a 40-car contingent from a branch of the United Nations. Hanson, who taught school camouflaged in sideburns at the tender age of 17, has enjoyed greatly the educational accomplishments of his 400 green acres in spreading the doctrine of soil conservation as achieved through careful technical planning by the Soil Conservation Service, cooperation under the Montgomery Soil Conservation District, and intelligent application of modern farming methods.

What Hanson did not reckon on, however, was a realistic demonstration of the fire-insurance value of his farm pond, a pond which is his particular pride and joy and the first to be constructed under a 1,000-pond program now well advanced in the State of Maryland. A blue jewel of esthetic, recreational, and stock-watering values, it occupies a logical site down the slope between house and highway. It was constructed in 1946 at a cost of \$1,000 through cooperation of the Soil Conservation Service, the Maryland Game and Inland Fish Commission, the Montgomery Soil Conservation District, and the Montgomery County Board of Education. Many a school boy picked up some needed wages and some even more-needed soil conservation knowledge in its making. Its completion was heralded by the planting of 500 bream and 50 large-mouth bass in its waters. Hugh Bennett, America's conservation chief, poured in the first can of fish. Also present were Ed Davis, State soil conservationist; Eugene Walker, chairman of the district; Malcolm King, State wildlife field supervisor; Marion B. Fussell, district conservationist; Henry C. Dulany, conservation aid and O. W. Anderson, county agent.

Three springs feed the pond and enable it to store 1,500,000 gallons of water. As a matter of fact, the springs came to life, flowed more gener-



Flames under control. (Photo by Malcolm King.)

ously, after Hanson installed his all-pasture program. The pond is 9 feet deep at its deepest and is so constructed with overflow pipes that even a cloudburst could do no damage. "The area roundabout is seeded to provide cover for wildlife, and the water will be available if ever a fire should break out on the Hanson farm," observed one newspaper man.

Fire protection was indeed an important consideration. William Hanson never in his life had been a victim of fire, but fire was his one great fear in connection with his large farm investment. With some of his savings from his business career, he had built a 12-room house, a \$15,000 barn, stables, machinery and tool sheds, all architecturally harmonious and attractive. Hanson slept better after he had the pond.

For 3 years and more after the pond was built life on Mount Prospect Farm was as nearly idyllic as this "retired" businessman could wish. His cattle fattened and thrived—on pasture. He showed the champion carload of feeder steers at the Baltimore livestock show, also the champion load of Berkshire barrows. Twice the pond's convenient waters saved neighboring houses from destruction by enabling volunteer fire companies from Silver Spring and Rockville to refill their tanks quickly.

The farm is regular host to the Marlboro, Warrenton, Middleburg, and Orange County hunts. And it was on George Washington's Birthday, this year, that pink-coated members of the Potomac hunt were involved in even more excitement than they bargained for. A little before noon they had gone through all the rituals, including the stirrup cup, and then cast their hounds. The hounds were in full pursuit of a large red fox when Hanson looked back from a rise in ground and saw

smoke pouring from the top of his barn. As word of the fire reached the rest of the riders, they abandoned the chase and hurried back to aid. By that time, one by one, the animals had been led from the burning building. Within 15 minutes, Gaithersburg-Washington Grove and Rockville volunteer firemen arrived, laid their hose lines, established two pumpers down by the pond 1,100 feet away, and began throwing 5-inch streams of water on the flames. In a few minutes the fire was under control. Hanson's tractor with its manure loader rapidly removed the smoldering bales of hay, and on these and smoking embers firemen played water for some hours.

"It was the first time," said Hanson, "that these fire companies had had plenty of water to work with and a chance to try out their new equipment."

Notwithstanding damage of \$10,000—amply insured, another \$20,000 worth of barn and adjacent buildings, together with equipment, was saved by the pond. Thus it was that Hanson topped off his long series of demonstrations by showing to a large audience exactly what he meant when he talked of a farm pond for fire protection.

When William Hanson purchased his 400 rolling acres in 1942 the marks of the plow were apparent. Only 8 acres were in grass and even these had been destined for cultivation. Hanson fenced his property well. Then he put all but 80 acres of timber in pasture. He bore down heavily

on Ladino clover, orchardgrass, Kansas brome, alfalfa, lime, manure, superphosphate, and 0-14-7 fertilizer. He filled the gullies with brush, manure, and straw, and smoothed them over. He gave his woods that well-cared-for, managed look, had them marked for thinning and began to get from them a substantial annual revenue. He worked according to a soil conservation plan developed by SCS technicians. Today, his white home on its green carpet constitutes a well-groomed estate known far and wide as a show-place. And in the pond are good-sized bass and bream waiting to challenge his skill as a fisherman.

Farm ponds have many advantages and a great many farmers want them. Hugh Bennett says to his SCS farm planners: "Don't overlook farm ponds. They are good for conserving water and water is necessary for farm stock of all kinds. They come in handy, too, for spraying purposes, irrigating gardens, and putting out fires. Farm ponds afford good fishing, boating, and swimming, and when you have one you can tell where your youngsters are, and your neighbors' youngsters, on Saturday and Sunday afternoons.

"Tell farmers about them. I haven't yet seen any farmers who don't like their ponds. The Service has put in more than 50,000 already. They help make fishermen out of nonfishermen, and that too is of importance. I have never seen a fisherman who isn't a fine fellow and good citizen."



Saving the day at Mount Prospect Farm. (Photo by Malcolm King.)

Grass Magic

IN NORTHEASTERN COLORADO



By JIM WILSON

FARMERS on the sandy soil in the northeastern corner of Colorado knew they had to do something about their land or soon they wouldn't have any. It was the best dry land in the State for Great Plains moisture conditions. Even in drought years when the wheat on the "hard land" burned up, the sandy land produced crops. But it was going to pieces—fast! For 50 years they had corned and wheated it continuously—churning the loose ground, taking off without putting back, breaking down the fertility and tilth of the soil till only the bare bones remained on many fields. Now the wind was even taking the bones, scooping out blow-outs, piling up dunes, raining dead sand on the good land that was left. At first they hadn't known they were murdering their farms, but they knew it now!

They weren't "suitcase farmers." They had a lot of money invested in permanent improvements and a lot of heart and soul invested in their way of life. They'd put down roots and built a community based on lasting, wholesome human values. They couldn't see it swept away.

Wally Bruce, the new district conservationist, believed in that kind of community. "Boys," he said, "I've just been down to the SCS grass nursery at Albuquerque. You wouldn't believe what these new planted grasses will do on run-down dry land"—and he told them what he had seen.

They didn't believe, but Rex Meakins, north of Hextun in Phillips County, was willing to try a few acres of crested wheat. He sowed it in bare, unprotected blow-sand. Whipped to death by the wind, it failed. "Let's try it again, in cane stubble," Wally urged. This time it grew. Soon farmers were coming from 20 miles around to see it.

That was in 1943. Today, in the four counties of Logan, Phillips, Sedgwick, and Yuma, there are more than 30,000 acres of crested wheat, tall wheat, and intermediate wheatgrass, sand lovegrass, brome grass, Russian wild rye, and other planted grasses. Farmers of the area call their corner of Colorado the grass reseeding capital of the United States.

Many farmers who tried Wally Bruce's idea skeptically are now making more money per acre from grass than they ever made from cultivated crops on the same land, and making it easier.

Mike Gretch, of Sedgwick County, had always been a corn farmer, putting his land to wheat every third or fourth year to give it a rest from cultivation and keep it from blowing away. It was a losing game. He couldn't use barnyard manure to maintain the fertility—on dry land it competes with crops for scarce moisture and often makes them burn up. As the fertility of his land declined, the yield of plant refuse—straw and stalks—dwindled till it was hardly worth working back into the soil. Thus the break-down continued at an even faster pace. Year after year the corn yield declined. Cornstalk wheat didn't even pay expenses any more, but he had to keep raising it. He didn't dare cultivate the land every year.

In 1943 Mike started planting grass. It took him 4 years to learn the game and get a full stand of crested wheat on the first 20 acres—but he stuck to it. Year before last he sowed crested wheat in cane stubble on a barren, sandy 3-acre hilltop that had never produced more than 3 bushels of corn or 2 bushels of wheat to the acre. The next year he harvested 300 pounds of seed from this patch, after pasturing it 6 weeks! This was more return in one season than he had got from this land in the last 17 years altogether.

On his 560-acre place Mike has 30 acres of crested wheat, 140 acres of native grass, and

NOTE.—Reprinted by permission of Ford Farming, Dearborn, Mich.

smaller plots of sand lovegrass, intermediate wheat and tall wheatgrass, which he plans to enlarge to provide balanced pasture throughout the season. The crested wheat comes on early in the spring, followed in turn by the tall wheat, the intermediate wheat, and the native grass, which is at its best in June and early July. By late summer, when these are all brown and sere, the sand lovegrass is booming along, green and succulent. It lasts till fall, when the crested wheat greens up again.

The wealth of rich green forage bursting from Mike's "worn-out" fields still looks like a miracle to him. How do these amazing little seeds from central Asia and elsewhere unlock the life in seemingly dead land? What makes them yield up to four and five times as much forage as the native short grass? He doesn't know, and neither do I. He just knows that the Soil Conservation Service has canceled the death sentence that hung over his farm—that while his cattle are getting fat on the protein-rich growth, the dense, penetrating roots are anchoring the sand and turning it back into soil. Wheat and corn allotment cuts don't worry him. He's cutting every year, voluntarily.

Northeastern Colorado farmers are learning ways to help grass help *them*. Last spring, after planting and fertilizing his corn with nitrogen and phosphate—commercial fertilizer works on dry land where manure fails—Mike cleaned out his fertilizer boxes in a corner of his crested wheat patch. The grass grew twice as rank there! This spring he's fertilizing all his grass.

Bill Oliver of Phillips County plants sweet-clover with his crested wheat, besides fertilizing it with commercial nitrogen and phosphate. His records show that this grassland averages about 40 percent more profit per acre than the land in wheat and corn. He has one 16-acre field of crested wheat seeded in the spring of '45. The second year, after pasturing 11 cows on it from April 1 to May 20, he harvested 400 pounds of seed per acre, then pastured it again from September 15 to November 18. "The seed crop alone," he says, "brought more than twice as much as the average crop for the five preceding crop years."

The next year he pastured it all season. Last year he pastured it 5 weeks in the spring, harvested 10,000 pounds of seed, and pastured it 2 months in the fall! Recently, after 3 months of wind, with almost no rain or snow, he wrote me, "It

sure looks good. The immense root system and thick turf defy wind and drought."

Although two reseeding enthusiasts, Harvey Harris of Sterling, and Frank Sparks of Fleming, have planted over 2,000 acres apiece, most of the grass acreage in northeastern Colorado is in comparatively small plots on many farms. The aim of the Soil Conservation Service has been, first, to dot the area with hundreds of local sources of seed; second, to show farmers how grass fits into an integrated, diversified farm plan; third, to heal the scattered "open sores"—the blow-outs, dunes, and go-back patches—as quickly as possible.

The tractor owned by the Haxtun Soil Conservation District since 1943 has seeded thousands of acres in small plots for large-scale farmers who find their own equipment too big and cumbersome for grass farming.

When a farmer finds how profitable his few acres of grass are, he is sure to plant more. In 1944 Henry Lambert borrowed the district tractor and planted 8 acres of mixed sandgrasses on a barren blow-hill where the sand was so loose he couldn't use his own equipment. By the second year, the stand was so well established that he began grazing it—the first return he had ever got from the land. "That convinced me," he told me. "I put out more grass every year after that—sand love, intermediate wheat, crested wheat and tall wheat. My intermediate wheatgrass made 175 pounds of seed to the acre last year. It's worth a dollar a pound, but I'm planting it all back on my own land this spring. I've got a fourth of my farm in grass now."

Gordy Knode, north of Haxtun, in the light sand, has seeded 180 of his 320 acres to sand lovegrass, Lincoln brome, crested wheat, intermediate wheat, stiff-haired wheat and tall wheatgrass, planting it with commercial fertilizer and sweet-clover. "The clover supplies nitrogen to make strong, healthy grass," he says, "and after 5 or 6 years I figure the grass will have put enough 'binder' back into the sand so I can plow it up again."

However, Wayne Chaney, of Haxtun, also planned to plow up his crested wheat after 5 years, but when he figured the per-acre beef yield, he decided to leave it and plant intermediate wheat and sand lovegrass besides. Max Fulscher, of Amherst, a "hard land" wheat farmer, says the patch of crested wheat he planted 13 years ago as an experiment is still the most profitable piece of

ground on his place. He pastures purebred Herefords on his winter wheat, then tides them over on crested wheat till the native grass comes on.

These farmers are finding that grass pays off in other ways besides pasture, hay, seed, and improved soil. There's a wonderful stand of bindweed on the railroad right-of-way through T. A. Norton's farm near Peetz! To keep it from spreading into his fields he corralled it by planting a strip of crested wheat on each side. The crested wheat is spreading into the bindweed! (Western Nebraska farmers say crested wheat will absolutely kill out bindweed.)

Frank Sparks, who has 2,200 acres of crested wheat, intermediate wheat, Russian wild rye, Lincoln brome, and sand lovegrass, drilled a 65-acre patch that was "absolutely solid with cockleburrs" to crested wheat in August 1944. It got a good rain, all came up—and crowded out the cockleburrs the first year. Frank uses his crested wheat as a "hospital pasture" for sick cattle and those that have gone through the winter on dry feed and are suffering from malnutrition. "They pick up right away," he says. Early-growth crested wheat is so rich in protein, phosphorus, and vitamin A (carotene) that some feed companies cut and dehydrate it. The dehydrated grass, with 20 percent protein, is almost a concentrate!

Crested wheat was the pioneer planted grass in northeastern Colorado and it is still the most popular, with more acreage than all others combined—mainly because farmers believe it to be the most drought-resistant of all. But the newer grasses are catching on fast. Each has its points. Intermediate wheatgrass, though less hardy and drought-resistant than crested wheat seems to yield almost twice as much forage. Tall wheatgrass is best for alkali soil, and looks promising for sand. Ernie Sonnenberg of Sterling says that, although tall wheatgrass *looks* coarse and unpalatable, his cattle prefer it to all other grasses in August. A neighbor says *his* cattle eat the new stiff-haired wheatgrass like candy. Sand lovegrass is uniquely adapted to sand—does well even on pure blow-sand—and keeps growing when other grasses are dormant. Brome, the top grass farther east, uses too much nitrogen to plant alone on light soils, but many farmers are sowing it successfully in established stands of the new Stafford "dry land" alfalfa developed by Clarence Stafford of Haigler, Nebr.

All these grasses are palatable and high in pro-

tein, and all fit into the picture. If you plan to go into grass, your soil conservationist or county agent can work out a sequence for you that will provide continuous pasture from about April 1 through to January. It's best to plant the different grasses in separately fenced plots and graze them in rotation. Cattle on a mixed pasture tend to concentrate on the grass they like best and graze it to death.

You can plant grass any time from September to April when moisture conditions are good. Don't plant after April—the seedlings will die in the mid-summer heat. Early fall plantings germinate soon and are well established by winter, but may die if moisture is short. Late fall and winter plantings germinate after the snows and spring rains. Plant sand lovegrass early enough to go through a hard freeze to crack the hull—otherwise it may not germinate. Some dealers pre-freeze the seed to make sure.

If you don't have a grass drill, says Wally Bruce, a grain drill will do. When planting mainly for seed, northeastern Colorado farmers plug some of the spouts and plant in rows far enough apart to cultivate. For pasture and hay, regular drilled stands are best. Seeding rates and depths depend on the size of the seeds and type of land. See your conservationist for details.

Grass needs a firmly packed seedbed and the tiny seedlings need protection from blowing soil. Many hard-land farmers summer-till, pack the ground, and sow by September 15 (earlier, if there's moisture) with a thin stand of oats. The oats keeps the soil from blowing till the grass gets started, then winter-kills and doesn't compete for moisture in the spring. Sandy-land farmers north of Haxtun plow deep early in spring, drill sorghum in June, and sow grass (preferably with sweetclover and fertilizer) in the stubble in fall.

"However you plant," says Wally, "don't plow up your field in disgust too soon! It may take a year, even 2 years, for all the seed to sprout. One farmer planted his field three times without getting a stand—he thought! It *all* came up the third year.

"At first you'll see only a few tiny spears in the midst of the weeds. The next year there's a stand. Soon you're wondering how to keep it from getting too thick."

To keep sand lovegrass from crowding itself, Rolly Broughton leaves the straw on the ground

(Continued on p. 261)

INCOME RISES AS THE FARM MENDS



By W. M. NIXON

SOME folks are likely to grumble a little when it comes time to pay Federal income taxes. But not Gerhard Koehler who has a 166-acre farm in the Middle Guadalupe Basin Soil Conservation District near Yoakum, Tex. He pays cheerfully.

Koehler points out that paying income taxes means that his farm is on the mend, its soil improving, and the place increasing in value. It means that he himself is getting more revenue from his farm, that he can take better care of his family. He's glad to let Uncle Sam have a share of what the farm earns.

About 10 years ago Koehler's farm was in a bad way. The topsoil was eroded and depleted. Crops of poor quality were getting skimpier. It was taking more and harder work all the time to get any production at all. Then Koehler went to his soil conservation district supervisors for help. The supervisors approved his application and asked Soil Conservation Service technical men to

work with him in developing a well-rounded conservation plan that fitted his farm, and in getting it put on his land.

Conservation plans began to take shape in 1942. That year Koehler figured his income at \$1,521.57. As in previous years of low farm production, there was no income tax to pay that year. Next year, however, as his conservation practices began to show measurable results, income was up to \$3,043.08, and Koehler proudly paid the Government which had been helping him \$7.74 in income tax. Koehler felt especially proud of his income tax payment for 1946. It was \$134.73. Income that year was \$3,815.44. Income for 1947 and 1948 was well over the \$4,000 mark. It had increased more than 186 percent since his farm began recovering its lost productivity through his soil conservation work.

In Koehler's system of soil conservation measures, guar looms large. He has kept records to show the value of this legume, a relatively new conservation crop that helps protect the land and condition the soil. For example:

Koehler planted 6 acres to guar on May 25, 1948, using 10 pounds of seed and 300 pounds of super-

Note.—The author is regional agronomist, Soil Conservation Service, Fort Worth, Tex.

phosphate to the acre. The 6 acres had previously been in grain sorghum. Koehler ran out of fertilizer so that half an acre received no phosphate. He cultivated the guar twice and harvested seed late in November, getting 1,375 pounds of seed by combine despite rainy weather. After the seed harvest, he went over the area with a stalk cutter to make a mulch of the guar residue. Late in December he flatbroke the field and in January 1949 disk-harrowed the land and laid it off in rows. The first week in March he planted corn.

On adjoining land of the same kind of soil that had been treated with neither guar nor phosphate, Koehler harvested 16 bushels of corn an acre. The half acre that had the benefit of guar but not of phosphate produced corn at the rate of 34 bushels an acre. On the rest of the 6 acres planted to guar and fertilized with phosphate, the yield was 49 bushels an acre.

It's easy to understand why Koehler has taken a fancy to guar as a crop that helps to protect his soil against erosion and build up its fertility. Of the 1,375 pounds of seed he harvested from his 6 acres, he sold 1,000 pounds to other farmers cooperating with the Middle Guadalupe Basin Soil Conservation District, and used the rest to increase his own planting to 25 acres.

Guar, however, is only a part of Koehler's well-rounded system. He uses other crops that help to prevent erosion and increase productivity. His cropland is cultivated on the contour to keep the soil from washing down slopes. Terraces and diversions carry excess rain safely off and around his cultivated fields. On his pasture lands he mows to keep weeds under control and he otherwise encourages the growth and spread of good forage grasses by keeping the number of his beef and dairy cattle small enough to avert overgrazing.



Gerhard Koehler and son inspect seed pods of soil-improving guar, a plant now expanded to cover 25 acres.



Harry Koehler, Gerhard Koehler, and Troy Berry, SCS technician, compare size and quality of corn. The baskets represent relative yields. The big full ear Koehler holds came from soil conditioned by guar and fertilized with phosphate; yield averaged 49 bushels of high-quality corn. The smaller ear Harry holds came from soil conditioned by guar but not treated with phosphate; yield ran 34 bushels per acre. The small, partly filled nubbin in Berry's hand came from adjoining soil of same type but unbenefited by either guar or fertilizer; the area yielded 16 bushels of inferior corn per acre.

Because of the work he has done in soil conservation, Koehler was awarded a plaque last year in the *Fort Worth Press* "Save the Soil and Save Texas" awards program. He had been judged the year's best conservation farmer in his soil conservation district. He is helped in running the farm by his son Harry, World War II veteran, who is studying farm-equipment mechanics.

Koehler not only applies conservation measures to his own place; he also talks conservation to his fellow farmers and uses his farm as a sort of laboratory where they can come and see the results of the practices he adopts to keep his soil in place and build up its productiveness, like the plot he set up on November 8, 1945:

On one part of the plot he planted annual yellow-blossom clover, using 10 pounds of seed and 400 pounds of superphosphate an acre. On the other part he didn't plant clover or apply phosphate. In the spring of 1946 he seeded the whole plot to cotton.

On August 9 a group of fellow farmers came to see what was happening. They saw that where no clover had been grown or phosphate applied, the cotton was dying from root rot. Plant growth and color were poor. Where the plot had been conditioned with clover and fertilized with phosphate, however, the cotton plants had good vigorous growth and healthy color and there was no evidence of root rot.

The treated part of the plot yielded at the rate of 368 pounds more of seed cotton an acre than the part not benefiting from clover or fertilizer.

Since then Koehler has been a generous user of annual yellow-blossom clover. He further helps his land by rotating corn and cotton with the cover and soil-improving crops.

Koehler was highly pleased when he applied his test-plot findings to a 20-acre field and got three-quarters of a bale of cotton an acre in 1947, a better yield than he obtained on the plot. And last year he did even better. He harvested 17 bales of cotton from 19 acres that had been conditioned with yellow-blossom clover and treated with 300 pounds of phosphate, the clover having been turned into the surface of the soil in March.

"I used to average a quarter of a bale an acre before I worked out this conservation plan with help from the Soil Conservation Service fellows,"

Koehler commented. "A third of a bale used to be a big crop."

Acre yields of other crops on the Koehler farm have also increased greatly under his conservation plan. For example, flax has doubled in yield from 6 to 12 bushels an acre.

Out of his higher income, Koehler has bought a combination grain and fertilizer drill for planting soil-improving cover crops of legumes on his and his neighbors' farms. He has also bought a combine for harvesting legume seed for himself and his neighbors.

Koehler is not hesitant in giving full credit to his soil conservation plan for controlling the erosion that was eating his farm away and for restoring the productiveness that has been boosting per-acre crop yields and increasing the value of his land. And he doesn't mind paying Federal income taxes. In fact he's quite happy about it.

SOIL AND WATER LOSSES REDUCED BY IMPROVED FERTILITY

By DWIGHT D. SMITH

THAT soil fertility has a very significant effect on runoff and soil erosion has been shown by experiments conducted at the Midwest Claypan Soil Conservation Experiment Farm near McCredie, Mo., a cooperative research and development project of the Soil Conservation Service, United States Department of Agriculture and the Missouri Agricultural Experiment Station. The results emphasize the fact that an infertile soil is an erodible soil. They show how production can be tripled and at the same time field erosion reduced over 90 percent. This is accomplished not by one but by several important practices. They are: (1) crop rotations that include grasses and legumes, (2) return of crop residues to the soil, (3) contour farming with terracing as the magnitude of slopes dictates, and (4) scientific application of commercial fertilizers. These claypan soils inherently low in fertility have thus been improved to the extent that their performance is approaching that of the better soils of the State.

The erosion process involves a balance of forces. Raindrops falling through the atmosphere have

mass and velocity, and hence possess energy. When they strike the surface of the earth and explode like miniature bombs, their kinetic energy is expended. This energy in the rainfall of a normal growing season on one acre is more than that required to plow, plant, cultivate, and harvest an acre of corn. Rainfall not absorbed by the soil acquires additional energy, enabling it to carry soil as it flows down the slope to the field drainageways.

Vegetation is the most effective medium to resist the erosive force of the rainfall. Vegetation, either living or as crop residue, absorbs the energy of impact of the falling raindrop to reduce or eliminate splash erosion. If it is grasses and clovers, the soil is conditioned to resist the erosive forces of the raindrops during the period between seedbed preparation and the development of a protective cover by a new crop.

The growth of the crop and its ability to provide (1) soil-cover protection and (2) soil conditioning are, of course, dependent largely upon the fertility of the soil. There is a third important means of reducing erosion that is directly related to soil fertility. It results from the fewer acres of grain crops, under which erosion normally occurs, that are required for production of a given amount of

NOTE.—The author is research project supervisor, U. S. Department of Agriculture, Soil Conservation Service; and research associate, Soils Department, University of Missouri.



The oats crop on the Putnam soil requires fertilizer for high yields and erosion control. Above: Oats in 2-year rotation with corn, but without soil treatment. Below: Same basic rotation but with lime and with sweetclover as a green-manure crop before the corn, and with 200 pounds per acre of 10-20-20 fertilizer on the oats and corn. Midwest Claypan Soil Conservation Experiment Farm, McCredie, Mo.



grain when yields are high. This acreage, no longer required for production of grain, may then be seeded to perennial grass and legume pastures, under which erosion will be negligible.

Fertilizer has its greatest effect on runoff and erosion under the small grains because of directly associated cover differences. The fertility treatments are of increasing importance as the soils are poorer from whatever cause, whether natural or through depletion from erosion and cropping.

Unfertilized wheat has developed much more slowly and has suffered greater winter killing than fertilized wheat on comparable plots in the same cropping system at McCredie. This difference in cover, during the 9-month period from seeding to harvest, resulting from the use of 200 pounds per acre of 0-20-10 fertilizer, has reduced runoff 16 percent and soil loss 42 percent. These results (table 1) are averages for four seasons.

TABLE 1.—Effect of 200 pounds per acre of 0-20-10 fertilizer on runoff and erosion under wheat from Oct. 9 to June 29. Average for 4 crop seasons during the period 1943-46

[Putnam silt loam plots: 3-percent slope: 26.51 inches average rainfall]

	Unfertilized plot	Fertilized plot
Runoff.....inches.....	9.72	8.15
Soil loss per acre.....tons.....	4.31	2.52
Yield per acre.....bushels.....	8.4	20.9

The difference in wheat yield, at present prices, shows a return of \$23.50 for \$5.26 invested in the fertilizer, or a return of \$4.50 per dollar invested.

With oats, the difference in favor of an N-P-K fertilizer has been even more striking. These data were secured during a 3-year period of relatively light erosion following 6 years of similar cropping and treatment, or lack of treatment in the case of the unfertilized rotation (table 2). No other result could be expected when one considers the difference in cover (fig. 1) of the fertilized and unfertilized oats 6 weeks after planting.

TABLE 2.—Effect of 200 pounds per acre of 10-20-20 fertilizer on runoff and erosion under oats from Apr. 19 to July 9. Average for crop seasons during 1947, 1948, and 1949

[Putnam silt loam plots: 3-percent slope: 10.95 inches average rainfall—3.57 inches below 9-year average]

	Unfertilized plot	Fertilized plot
Runoff.....inches.....	2.39	0.24
Soil loss per acre.....tons.....	1.18	.07
Yield per acre.....bushels.....	6.6	27.1

Crop residues have furnished effective winter cover protection. Corn stalks left on the soil in contrast to corn stalks removed have reduced erosion by about one-half from late September to oat-seeding time the next spring.

When vigorous stands of grass and legumes are plowed under before corn, the erosion under the corn has been reduced to one-fourth of that under corn not preceded by the soil-conditioning crops. Fertilizers have been required to produce the quality of grass and legumes necessary for maximum soil conditioning. The more vigorous stand of meadow provides a greater root system to hold the soil together and also returns a larger amount of top growth when plowed. The soil aggregates following the meadow crop have an improved stability. There is a greater proportion of the larger soil particles. Larger aggregates are, of course,

less easily carried from the field by the runoff water. Sweetclover as a green manure has been very effective in soil conditioning, but not to the same extent as grass and legume sod (table 3).

TABLE 3.—*Nine-year average runoff and soil loss, Apr. 27 to Oct. 8, and 4-year average aggregation and organic matter under corn preceded by different soil-conditioning crops*

[Putnam soil loam plots: 3-percent slope: 24:11 inches average rainfall]

	Corn following—		
	Oats	Sweetclover under	2 years grass and legume meadow
Runoff.....inches.....	6.06	4.68	3.79
Soil loss per acre.....tons.....	7.72	3.38	1.81
Aggregate size ≥ 1 mm. ¹percent.....	31	28	43
Relative aggregate stability ²do.....	64	61	79
Organic matter.....do.....	2.67	2.64	2.83

¹ Average of samples secured, 1944-47.

² Amount stable under wet sieving as percent of amount stable under dry sieving.

Adequate soil fertility treatments according to soil needs are particularly important on these low fertility claypan soils if the erosion-control advantages of several years of grass and legume meadow in a rotation are to be secured. Soil loss under corn following 4 years of meadow averaged 41 percent greater than under corn following 1 year of meadow during the initial 6-year period of study when only 200 pounds per acre of 0-20-10 fertilizer was used on the small grain of the rotation. During the following 3-year period, in which nearly adequate amounts of N-P-K fertilizer were used on all crops, the soil loss under corn following 4 years of meadow was 21 percent less than that following 1 year of meadow. Adequate soil treatments have made the long meadow rotations more effective from an erosion-control standpoint and highly desirable from a farming and production standpoint.

If a farmer on the Putnam soil wished to produce approximately 1,500 bushels of corn equivalent each year and used a corn-oats rotation without soil treatment, he would require 100 crop acres according to the 9-year average yields for this system at McCredie. The 50 acres of corn at the 9-year average yield of 23.2 bushels per acre would produce 1,160 bushels. The 50 acres of oats at the average yield of 15.2 bushels would produce 760 bushels of oats, or in terms of corn equivalent, 357 bushels; or a total of 1,517 bushels of corn equivalent from the 100 crop acres. Erosion, if

the fields were of 3 percent slope, the same as the McCredie plots, and were farmed up and down hill, would carry away an average of more than 18 tons of soil per acre annually. If the farmer changed the system to corn-oats and sweetclover with adequate soil treatments, he could reduce the grain acreage by two-thirds and produce a corn equivalent of 1,522 bushels. The remaining 67 acres could be returned to permanent grass and legume pasture which would produce beef, based on the McCredie pasture returns, equivalent to 42.6 bushels of corn per acre. Total production from the 100 acres would average about 44 bushels of corn equivalent per acre, or three times that of the original system. Erosion on the 33 cultivated acres would average about 10 tons per acre, but if terraced and contour-farmed, erosion would be reduced to less than 1 ton of soil loss per acre. With the remainder of the field in a permanent grass legume pasture, erosion for the 100 acres would result in an average soil loss of less than 1 ton per acre annually.

Numerous other systems could be used, according to the land and the farmer's needs; for instance, a 4-year rotation of corn-wheat-2 years of meadow. This system would leave 34 acres for permanent pasture. Based on average McCredie yields the last 3 years, when nearly adequate soil treatments were used, production would also average 44 bushels of corn equivalent per acre from the 100 acres. Erosion from the 66 crop acres would carry off less than 2 tons of soil per acre if contour-farmed without terracing; hence, adequate erosion control for the 100 acres would be attained. A more practical system for the claypan-soils area where the fields are generally fairly uniform would be a 6-year rotation of corn-wheat-4 years of grass and legume meadow or pasture. Average crop yields would again be 44 bushels of corn equivalent per acre. Erosion on the 100 acres with only contour farming would run less than 1½ tons per acre annually, well within the limit for practical maintenance of productivity and at the least cost for conservation practices. Table 4 summarizes the production and erosion computations for the four systems.

The effects of soil cover and soil conditioning on erosion losses are, of course, a part of the systems here discussed. Soil treatments to make the reduction in erosion and the increase in production possible are not too expensive, especially when one considers the results. They will average up to

\$10 per acre annually for the 100 acres during the first 6 years. The treatments used included lime and rock phosphate as base treatments on both crop and pasture land. Ammonium nitrate was plowed under before corn, and for the small grain it was used before and after drilling. An N-P-K starter fertilizer was used with both the corn and wheat, on the third-year meadow, and on the pasture. After the first round of the rotation, some reduction may be possible. Constant use would undoubtedly result in higher yields than appear in the calculations, as these yields were secured during the first 3 years after the treatments were begun.

These results should present a challenge to a farm operator as to what may be possible on the lower-fertility soils. It will require careful management and working capital, although the investment in land should be less than on the soils of higher natural fertility.

TABLE 4.—*Field erosion and production for 4 cropping systems, calculated from plots*

[Putnam silt loam plots: 3-percent average slope]

	Rotations			
	Corn-oats	Corn-oats and sweet-clover	Corn-wheat—2 years meadow	Corn-wheat—4 years meadow ¹
Field soil loss per acre:				
Up and down hill ²tons..	18	10	3.4	2.6
Contour farmed ³do.....		5.4	1.8	1.4
Terraced and contour farmed.....do.....		.9	.3	.2
Area:				
In crops.....acres.....	100	33	66	100
Seeded to permanent pasture.....do.....	0	67	34	0
Total.....do.....	100	100	100	100
Yields per acre:				
Corn.....bushels.....	23.2	79.5	82.5	82.5
Small grain.....do.....	15.2	27.1	17.7	17.7
Meadow.....tons.....			2.2	2.2
Pasture (grass and legumes)				
pounds of beef.....		266	266	266
Corn equivalent:				
Cropland ⁴bushels.....	1,517	1,522	2,974	3,005
Pasture.....do.....		2,852	1,447	1,419
Total.....do.....	1,517	4,374	4,421	4,424
Yield per acre.....	15.2	43.7	44.2	44.2

¹ 2 years hay and 2 years pasture.

² 2.7 times measured plot losses. Field slope length is 5 times plot length.

³ 54 percent of up-and-down-hill losses.

⁴ Corn equivalent of oats is 0.47 times number of bushels. Corn equivalent of wheat is 1.15 times number of bushels. Corn equivalent of hay is 17.6 times number of tons. Corn equivalent of pasture is 0.16 times pounds of beef.

HIS TREES HAVE ROOM TO GROW

By J. M. CASE



Timber on the Arl Hildebrand farm was marked and selectively cut in 1940. In 1945 it was selectively cut for sawlogs. It was cut again in 1950. Yields have totaled \$100 per acre since 1939. Seven thousand board feet per acre remain on the tract at present, as against 3,000 board feet before proper management.

IN Nevada County, Ark., there's a farmer known thereabouts as the "daddy of farm forestry." He's Arl Hildebrand, whose 8-acre woodland reflects sound forestry and profitable woodland improvement.

Three selective cuttings, at 5-year intervals,

NOTE.—The author is forester, Soil Conservation Service, Hope, Ark.

AIRPLANE SEEDING OF SAND LOVEGRASS

By A. J. LONGLEY and M. D. ATKINS

EXPERIENCES of soil conservation districts and the Soil Conservation Service with sand lovegrass on the dunes of southwestern Kansas indicate that the airplane offers a solution to the problem of revegetating land that, to all practical purposes, can't be seeded to adapted grasses any other way. It promises a way to substitute better forage plants for the present stand of sagebrush and weedy grasses on this land where present grazing capacity is low.

Airplane seeding in this area got its start in 1947 when Chet Reeve, cooperating with the Finney County Soil Conservation District, seeded 800 acres of his 6,000-acre ranch with sand lovegrass by plane. In 1949 cooperators with the Finney County, Stanton County, and Seward County Soil Conservation Districts seeded 7,400 acres to sand lovegrass from the air. Seedings this year are more extensive.

Results are less than one gets from drilling grass seed, but they are encouraging. Some fair stands of sand lovegrass were obtained, and seeding costs were low enough to make revegetation practical by this method of seeding.

The seeding problem is faced on several hundred thousand acres. Predominantly sand, the soil is droughty and very subject to wind erosion. Native vegetation has been depleted, succeeded by a cover of sagebrush, weedy grasses and forbs of low feed value but capable of keeping the soil in place. These lands are still grazed, however, and ranchers want to improve both the protective cover and the quality of forage.

Seeding with ground equipment has proved successful, of course, but is excessively expensive and discouragingly slow. A crawler-type tractor is needed to pull equipment. Much of the surface is so irregular that it is hard to keep a drill in the ground. Susceptibility to wind erosion makes it inadvisable to destroy the present cover except in the better-protected low areas. These

Note.—The authors are district conservationist, Soil Conservation Service, Garden City, Kans.; and observational nurseryman, Soil Conservation Service, Manhattan, Kans.

have yielded Hildebrand a net return of \$800. And the volume of standing timber today is more than double what it was before his first cut in 1940.

The woodland, in 1940, was typical of many southern farm forests. It was dense, old-field pine, 30 years old, stagnated at a tree diameter of 9 inches with about 3,000 board feet to the acre. A clear cut would have netted Hildebrand about \$300. This sounded like a lot of money for a crop that just grew up by itself with no special care.

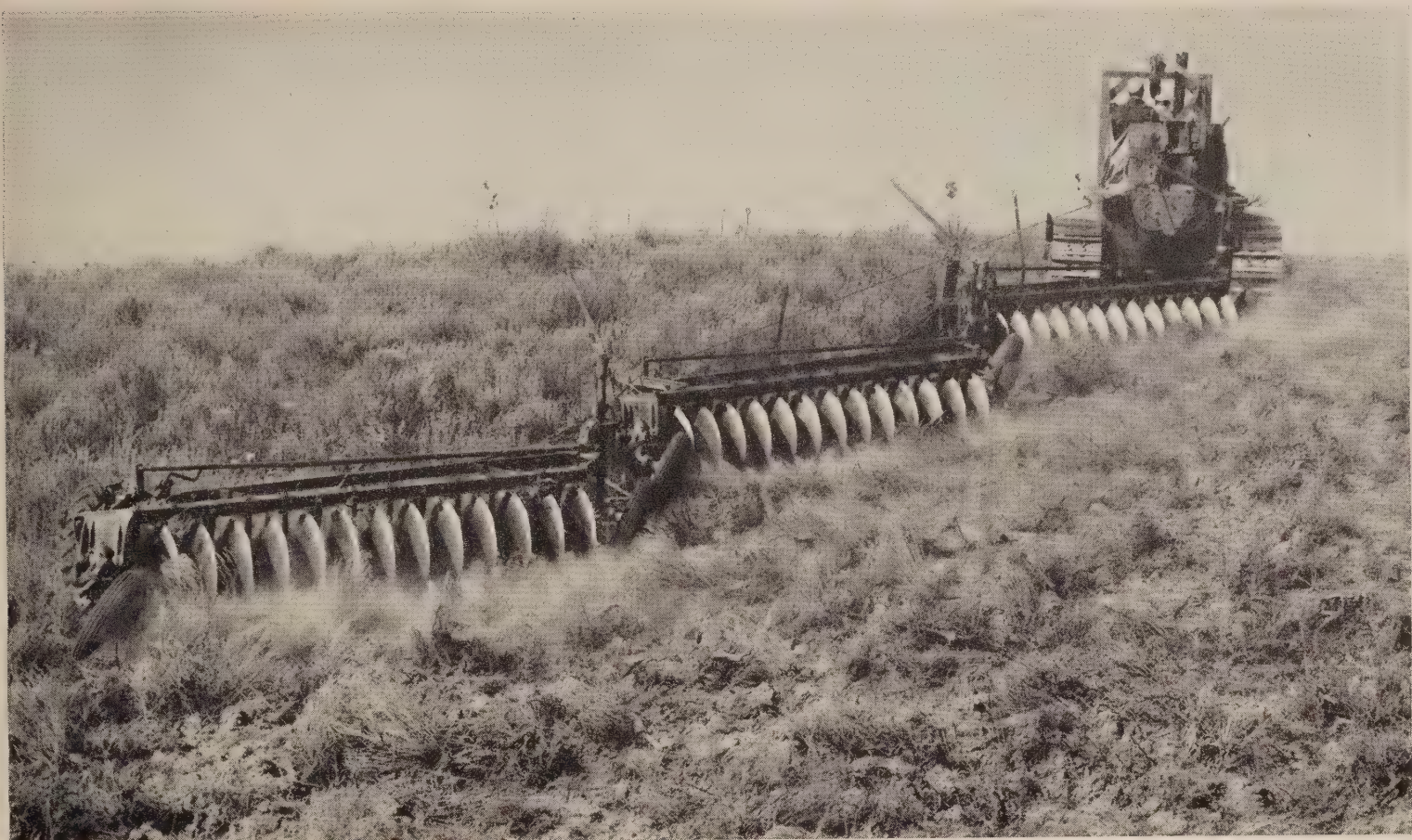
Hildebrand hesitated about selling outright. He figured it would take another 30 years to grow the same crop again. He talked to SCS technicians assigned to the newly organized Terre Rouge-Bodcaw Soil Conservation District. They told him about 5-year cutting cycles and selection of trees to be cut, leaving the better trees with space for growth. A local lumber company advocated the same type of management and practiced it on its own land. Hildebrand decided to try this new idea. He has never been sorry he did.

The stand was marked and cut in 1940, 1945, and 1950. Each time the better trees were left with space enough to grow but no space wasted. Sawlogs have been the principal crop. Pulpwood was salvaged from the tops and from smaller trees.

The trees now average 13 inches in diameter at cutting time and the woodland has about 7,000 board feet on each acre, compared with 3,000 in 1940. In the 10-year period Hildebrand has harvested \$100 worth of products off each acre. He has added another \$120 per acre capital stock—the increase in growth his trees have made since he started improving his woodland. This means that his woodland has been producing \$22 an acre annually.

Hildebrand didn't earn his title "daddy of farm forestry" solely as a result of his management record. He has explained the value of woodland improvement at every opportunity. Visitors are always welcome and he usually goes with them to look at his trees. Hardly a week has passed since 1945 that conservationists and foresters have not brought farmers and timber owners to see what timber improvement has accomplished on the farm. The woodland was a feature of a recent tour sponsored by the Prescott Chamber of Commerce.

Nevada County has staked a claim to the title "forestry capital" of Arkansas, and it is men like Arl Hildebrand who are helping to make the claim stick.



This equipment is being used by the Finney County Soil Conservation District to prepare sand-dune land for seeding by airplane. Eighty to ninety percent of the sagebrush, yucca, sand dropseed, and annual weeds are destroyed by this method when it is done in proper season. Only the more nearly level land and the lower dunes and ridges are treated this way because of the danger of wind erosion should the cover on the more exposed places be destroyed. The district furnished equipment and operator at \$1.50 per acre.

things sent ranchers and Soil Conservation Service men casting about for a faster, cheaper way of seeding.

Grass seeding by airplane is not new. But there is little data to indicate what results to expect under conditions such as those in southwestern Kansas. Nearly all seeding done in recent years in this High Plains area had been with conventional equipment.

Beginning in 1939, the Soil Conservation Service compared drilled seeding, broadcast seeding covered with a disc harrow, and broadcast seeding not covered. While stands from drilled and covered broadcast seedings were generally far superior, it was noted that the very-small-seeded sand lovegrass established stands when the seed was simply broadcast on the sandy land without any effort being made to cover it. This led to the use of airplanes.

The first seeding by Chet Reeve didn't turn out exceeding well. It was made too late in spring, but since moisture conditions continued ideal for several weeks a fair stand of sand-lovegrass seedlings emerged. Grasshoppers added to plant

competition. Most of the sand-lovegrass plants failed to survive the first growing season. Those that could be found by late summer had been eaten to the ground by the grasshoppers.

With sand-lovegrass seed costing \$3.50 to \$5 a pound, no airplane seeding was done in 1948. Farmers in the area were getting into seed production on their own, however. Sand-lovegrass seed became more plentiful and the price fell to \$1 to \$1.50 a pound. Eight ranchers cooperating with the Finney, Seward, and Stanton districts gave airplane seeding another trial, seeding 7,400 acres between February 16 and April 15, 1949.

These seedings were contracted to a commercial crop-dusting and aerial-seeding concern which used small trainer planes, at an average rate of 50 cents an acre. The only addition to the plane's crop-duster hopper and mechanism was an agitator and 12-inch propeller to drive it. The ranchers supplied seed, other material, and the services of flagmen.

First attempts indicated the need for a filler to add bulk to the sand lovegrass for better control of the rate of seeding. It was found that

ground milo mixed at the rate of 2 pounds of milo per pound of sand-lovegrass seed gave enough bulk to enable the seeding rate to be adjusted to 1 pound of seed an acre. The feeding mechanism, it was discovered, could be calibrated with ground milo alone before the sand-lovegrass seed was added.

A calm day is best for such seeding, but there is nearly always some wind in southwestern Kansas. A flight across the wind proved most satisfactory. The plane crossed the area to be seeded at 80-foot intervals. Flight elevation varied, depending on the topography of the land, but usually was less than 20 feet above the ground.

A check on one of the first fields planted showed 36 seeds per square foot at a point 20 feet out from the center of the plane, 18 seeds 30 feet out, and only 3 seeds per square foot at 40 feet out or at the outer edge of the flight strip. This indicates that flying narrower strips, or overlapping strips about 10 feet, is advisable.

Generally, there was no seedbed or ground preparation before seeding, and no effort was made to cover the seed. However, Reeve, who was making his second attempt, worked 160 acres of sagebrush range land and 80 acres of abandoned cropland with a one-way plow before seeding. The discs were run at a shallow depth to cut off sagebrush clumps and many of the sand dropseed and other weedy grass plants.

This operation was confined to the swales and lower dunes because of the acute danger of soil blowing. Every effort was made to leave all plant residues and litter on the surface. The few deep-rooted plants, such as sandhill bluestem, remaining in these range lands, were not damaged seriously.

Each of the 1949 plantings was examined carefully in June and October. Full results are not known yet, because many of the sand-lovegrass seeds do not germinate the first year. Stands varied widely but by far the best were on land that had been one-wayed before seeding. The earlier seedings showed up better than the late ones. One-waying apparently reduced competition for moisture by killing weeds and also made it more likely that the seed got covered.

John Burnside in Finney County seeded 500 pounds of sand lovegrass on 640 acres of depleted range land February 16 and 17, 1949, while there was still snow on the ground. A good stand of seedlings emerged, even though there had been

no tillage, and a fair stand survived at the end of the season. His pastures, however, do not have a heavy growth of sagebrush nor thick stands of weeds.

Chet Reeve made his planting early, February 20. He obtained a good stand of sand lovegrass on the one-wayed land, but a much poorer stand on the land that had not been tilled.

On the other hand, April seedings on land that had not been tilled in the Ralph Beach and Son ranch in Finney County, and in the C. M. Light, Jr., and J. E. Alexander ranches in Seward County produced very poor stands among the thick growth of sagebrush and weedy plants.

Because of the results in 1949 the board of supervisors of the Finney County Soil Conservation District borrowed three one-way plows to use with the crawler-type tractor they have on loan from the Soil Conservation Service. After trials they bought three such plows and are providing an operator and the equipment for tilling this rough sand-hill land at the rate of \$1.50 an acre. Two thousand acres were tilled with this equipment in the fall of 1949 for winter and spring seeding in 1950. Also, during the past winter, SCS seeded 2,000 acres of the land it manages in the Morton County Land Utilization project.

Many ranchers are now convinced that they can go ahead with reasonable assurance with airplane seeding. Attention is now being turned to the possibilities of seeding some of the bulkier grass seeds, so that a desirable mixture may be obtained with the sand lovegrass.

Substitution of a cover that is made up predominantly of high-quality forage plants for the present sagebrush-weedy-grass cover will more nearly assure continued use of this land for livestock production. It may even cause some of the nearby highly erodible cropland to be seeded down. Experience on the LU project and of soil conservation district cooperators indicates that such seeding can increase grazing capacity considerably and at the same time assist in erosion control.

VETS VISITED.—Departing from custom, the Harrison County (Mo.) Soil District Supervisors held a meeting with a group of GI farm trainees right out in the trainees' own community. They met at Ridgeway High School to review farm plans which the group had made for their own farms with the help of Farm Planner John Gibson.

Fourteen veterans were present. Their farm plans bring to 42 the number that have been developed for men enrolled in the on-the-job training program.

GRASS MAGIC

(Continued from p. 250)

after combining to smother the new seedlings. It also stops erosion and saves moisture. Two years ago he harvested \$1,250 worth of seed from 10 acres of blow-sand that cost him \$7 an acre. "Fertilize early—in February or March—for the best seed yield," he says. "Fertilizing too late even cuts down the yield sometimes."

All of these men warn against overgrazing. "Take care of your stand," says Harvey Harris. "It pays. A good stand of planted grass, well managed, will produce five times as much cattle gain as the native grasses, year after year. For the last 4 years, our crested wheat pastures have averaged 155 pounds of gain per acre as against 33 pounds from our best native grasses." One should leave enough litter and stubble to maintain the plants, prevent erosion, and conserve moisture.

Northeastern Colorado farmers turn the bulk of their grass into beef, though all have milk cows and a few run sheep. Bill Oliver says crested wheat makes prime hog pasture.

The best dollars-and-cents recommendation for this new kind of farming is that farmers who first planted grass only to rebuild ruined land are now planting it also on their best ground because it out-pays other crops. They hoped, at first, to get their grassland back into cultivation as soon as possible, but none has been plowed up yet. When it is plowed up, they will have better-than-virgin soil.

For years northeastern Colorado people have been living the kind of family and community life that pays off in the sustained yield production of human satisfaction, character, and social good. Now, at last, they've learned a kind of farming to match, that's paying off in the sustained yield production of crops and livestock without destruction of their means of life—the only kind of farming justifiable anywhere.

REVIEWS

FOREVER THE LAND. Edited and illustrated by Russell and Kate Lord. Harper and Brothers. New York. 1950. 394 pages.

This book, a country chronicle and anthology, by Russell and Kate Lord, is probably the best single moving account

yet written on the way the American people belatedly turned their attention to the improved care and use of soil and water.

It chronicles the determination and action of a small group of leaders, meeting in Washington in March 1940, to establish a Society to be known as Friends of the Land. It shows how this movement took root and grew despite blazing guns in Europe, and despite America's entry into the greatest war in history. It shows the early struggle to provide a sound underpinning for *The Land*, the Society's quarterly magazine which is now firmly established among the best periodicals in the country.

It further shows that from the beginning neither the organization of Friends of the Land, nor the quarterly which it sponsors, has followed a fixed or rigid formula. Chapters of the Society have been formed in such small rural county-seat towns as Mount Gilead, Ohio, as well as in metropolitan centers such as New York, St. Louis, Chicago, Cleveland, and Atlanta. Similarly, the book includes relatively obscure writers who have a message, as well as a Pulitzer prize winner like Louis Bromfield, or a world authority on conservation such as Hugh Bennett. The Society, through its organization, its publication, and meetings, has been a powerful influence in bringing city folks to a real understanding about their dependence on the good earth.

Backed by 30 years of interviewing, reporting, and writing, Russell Lord has no peer in interpreting the thoughts and feelings of country folk or the occupants of 40-story skyscrapers who vaguely sense that all is not well unless they get their feet on solid ground.

Readers, of course, will disagree on the merit of articles in the anthology. Some will vote for Jonathan Daniels' story about Hugh Bennett. Others will claim first priority for "Marvels at Our Feet" by Liberty Hyde Bailey, or "Dust in The eyes of Science" by Paul Sears.

All will agree, I believe, that Lord has selected the various articles and poems with appropriate discrimination and taste.

The make-up, typography, and illustrations combine to make the book particularly striking and unique. While Kate Lord's achievements as an illustrator are already well known, she reaches even greater heights of excellence in "Forever the Land." Her full-page illustrations, and others, are charming and reverent.

—GLENN K. RULE.

FARM WOOD CROPS. By John F. Preston. McGraw-Hill. New York. 1949. 302 pp. Illustrated. \$3.75.

"The purpose of this book is to present a technical guide to the development of a farm woodland enterprise integrated with the farm business . . . Farm forestry is a farm activity on the forest land that is included within the farm boundaries. It is primarily a farm problem—one of utilizing farm labor in woods work and forest products in the farm business."

To a person not a college-trained forester these quotations, from the preface of "Farm Wood Crops," are mere statements of purpose or definitions. No hackles are raised. The professional forester, however, will recognize them as something new and different in an approach to the teaching of farm forestry.

Many foresters never get out of the woods; many others who do go directly from there to the classroom. John Preston spent much of the last decade of his active career trying to get general acceptance of the simple fact that farm forestry is primarily "utilizing farm labor in the woods, and forest products in the farm business." He did not wholly succeed. Too many of his professional colleagues still avoid the manure pile; their thinking starts with trees that are being trampled by the cows, or with the board feet and vigor of marketable timber. "Leave farming to the farmers," they say, "we are foresters."

Preston's book will help get foresters and farmers together. That probably is why he wrote it. He recognized that there is no text available to forestry schools or agricultural colleges that takes forestry out of the woods and puts it on the farm.

Technically, the author attempted a tremendous job. In three chapters, 9, 10, and 11, comprising 100 pages, he has covered the strictly technical forestry material intended for application over the entire United States. These chapters are well illustrated (as contrasted with the balance of the book) and give the reader a good concept of cultural practices, protection, and planting and harvesting the farm woods crop. Depending on one's point of view, this brief coverage is either good or bad; good if one desires simplification and is satisfied with a general approach; bad if one wants to get into technical forestry as it applies to problems in the woodland of a given locality.

And right there is where this excellent presentation of forestry, as applicable to farming, may fail to get acceptance by educational institutions. Farm forestry is taught by foresters who generally are not in accord with a philosophy which says, "integrated farm forestry can best be promoted . . . by non-forestry-trained agricultural teachers and farm leaders." The few who do accept Preston's thesis will still want a text on "First Aid" in forestry, or what to do with an injured piece of woods or sick land in need of forestry treatment.

Preston has expressed a philosophy that needs universal acceptance before farm forestry can make much progress. He has done it well. Unfortunately, however, philosophical texts are not best sellers.

Lest there be a question as to the reviewer's personal appraisal of this publication, let the record show that he picked up several new and valuable ideas to use in his everyday job of getting agricultural workers acquainted with the farm woods. He strongly recommends it to others in similar positions.

—STANLEY S. LOCKE.

NOTES FROM THE DISTRICTS

INDUSTRY IS A PARTNER.—The 1949 report of the Knox County (Ind.) Soil Conservation District was paid for by advertising space purchased by farm contractors. The \$520 revenue covered all the cost of printing and mailing 3,000 copies.

Contractors met with the supervisors to learn technical standards and the type of equipment needed. The su-

pervisors invited the contractors to participate in demonstrations. The result has been more support for the soil conservation program.

"Actually a revolution is taking place in this district," says the report. "We have faith in the soil. It produces new wealth by which we can purchase the products of labor and industry."

THE CONTOUR LINES LAST.—Chemical sprays make it possible to increase conservation production per man, according to Harold A. Rothgeb, work unit conservationist at Hays, Kans.

Without some such device as spraying, Rothgeb points out, laying out the lines for terraces and other conservation measures can generally be done only during the short time between harvest and seeding time. Use of the chemical makes it possible to distribute the work load more advantageously and at the same time permit layout to be done during a longer period of the year and more economically because of better weather conditions.

Of course, some lay-out has been done and lines marked through wheat with a single-row lister, chisel, or other tillage tool. But the farmer objects to this. It makes combining a rough job with the high-speed machines now used. And in addition, it is slower than with chemical, Rothgeb says.

Sodium salt of trichloroacetic acid, commonly known as TCA, is used at the rate of 3 pounds of chemical and 3 gallons of water a mile. At 30 cents a pound for the chemical, the cost of material for marking lines a foot wide is less than \$1 per mile.

Other information can also be shown by the use of chemicals, such as marking arrows to show the direction water should be made to flow and other symbols to denote construction features for the information of contractors.

CONGRATULATIONS!—The newly formed Idaho State Soil Conservation Auxiliary is one of the first of its kind in the United States. This auxiliary was formed during the Idaho Soil Conservation District Supervisors Convention in Lewiston last November.

The auxiliary had its beginning in Weiser during the Idaho Soil Conservation District Supervisors Convention in 1948. There the women from the Lewis Soil Conservation District formed an auxiliary in order to prepare for the 1949 convention which was to take place in Lewiston. So much good work was done by the ladies that Milton Branch suggested that an auxiliary be formed for the whole State.

Mrs. Glenn Henderson of Nez Perce was elected president. The State was divided into several areas, each with a vice president and an adviser.

Mrs. Henderson says that the goal of the newly formed auxiliary is the promotion of soil conservation in the State. "I wish to have an informed group of women who through various women's groups and organizations can educate the public in soil conservation."

GRAZING SEASON EXTENDED.—Dick Burney, Jr., cooperator with the Copiah County (Miss.) Soil Conservation District, planted 3 acres of Class IV land to kudzu

about 10 years ago. It has furnished lots of good grazing during the late summer for the past 6 or 7 years. But Burney was not satisfied with 8 to 10 weeks' grazing each year, so he sowed reseeding crimson clover on the kudzu last fall. He had a luxuriant growth of winter grazing all last winter, which he said was better than he had on his Class II bottom land. Visitors stop by nearly every day to ask about the green carpet on that old rough hill, Burney reports.

GOOD WORK REWARDED.—The "Nail It Down Club" was born in Pullman, Wash., February 23, 1950, reports Frank Carothers, president. The new club, sponsored by the South Palouse Soil Conservation District, was created to foster conservation and to recognize outstanding contributions in the field of conservation. The club began to function immediately in a series of weekly radio programs the South Palouse Soil Conservation District is sponsoring on a local radio station.

At each weekly program, six in all, a farmer will be selected by the board of supervisors for some outstanding practice or accomplishment in soil conservation. He will be presented a certificate of membership in the new club, as well as a small token of appreciation provided by the local water-power company.

Charter members are Floyd Barkhuff, John Heitstuman, Bennie F. Druffel, Glen Kimble, Frank Carothers, Roscoe Cox, Troy Lindley, Pete Dacres, Rich Bakes, Clarence Hill, Mark E. Hill, Dr. Gordon McCloskey, and Henry Bongiorno.

TOP BILLING.—The *Poughkeepsie* (N. Y.) *New Yorker* put first-line emphasis on the importance of soil conservation recently when it inaugurated a newspaper telephoto service. As the first picture to come over its wires, it transmitted by special arrangements a photo of Kent Leavitt, then president of the National Association of Soil Conservation Districts, addressing the annual convention at Atlanta, Ga., and put it on page 1 of its February 27 issue. Leavitt's home is at Millbrook, close by Poughkeepsie. Soil conservation operations in Dutchess County district often are page 1 news in the *New Yorker*.

PACE SETTERS.—The Woodbury (Conn.) Rod and Gun Club is setting a stiff pace in soil and water conservation for other clubs in the Connecticut Wildlife Federation. Seventeen of its members are landowners who are cooperating with their local soil conservation district by improving their land with strip cropping, terracing, contour farming, drainage, diversion ditches, reforestation, and other erosion control practices and through wildlife management. In 1949 the club planted 1,462 Norway spruce, 910 hemlock, 1,175 red pine, 260 white pine, 906 multiflora rose, 153 high-bush cranberry, 109 bush honeysuckle, 416 privet, 35 grapevines, 31 flowering crab, and 14 elaeagnus. Five members grafted 157 scions of flowering crab. Five food patches were planted. The club sponsored a scholarship for the conservation workshop at the University of Connecticut and will sponsor another this year.

WELL-HEELED DISTRICT.—Clarence Reenders, chairman of the West Ottawa (Mich.) Soil Conservation District, recently astonished the Ottawa County board of supervisors by announcing that the district would not expect its customary annual appropriation. That's news in itself, but back of it is a story of good land use. Farmers in the district have learned to use tree land for trees.

The district operates its own nursery which supplies seedling trees to farmers at a nominal cost. About a million trees will be produced this spring. Farmers have planted more than 14 million trees in the county since 1939, largely on blown-out tracts and sandy land that formerly sold for a dollar an acre.

The operation of the nursery has put the district on a sound financial basis. Although erosion control was the primary purpose of the plantings, the sale of Christmas trees has proved an unexpectedly profitable side line. After thinning for this and other uses, good permanent stands of 200 to 300 trees are left.

DAUGHTERS OF THE SOIL.—The Freeborn County (Minn.) Soil Conservation District has a brand new organization. It's the Daughters of the Soil, women's auxiliary of the Soil Conservation Service and district personnel. Here are some of the things which the new auxiliary plans to do during the coming year: Hear Service people describe their work; review books on soil conservation; see motion pictures and slides; hear a talk on soil fertility and health; attend a supervisors' meeting; visit a soil conservation experiment station; make a tour of cooperators' farms. The members are considering attending the State soil conservation district supervisors conference and banquet in Minneapolis. Wives and daughters of district cooperators will be given an opportunity to join the organization.

WINNING SLOGANS.—"Conserve your soil now—don't wait. Tomorrow may be too late!" This was the prize-winning slogan selected from 175 entries in a slogan contest conducted over radio station WSDR, Sterling, Ill. Men, women, girls and boys, young and old alike, from both rural and urban areas, submitted entries.

Lee, Ogle, and Whiteside Soil Conservation Districts sponsored the contest in cooperation with the radio station. Two business firms in each district furnished prize money. Joe H. Folkers, Whiteside Soil Conservation District cooperator, of Sterling, coined the first-prize slogan, winning a \$100 savings bond.

Second prize went to a school teacher, Mrs. Arlene Samson, of Dixon. Her slogan, "Planned land will time withstand," earned a \$50 bond. Third prize, a \$25 bond, was won by O. C. Holt, of Amboy, a vocational agricultural instructor, who wrote: "Our golden heritage—Guard it well. Use it wisely. Stop erosion." Fourth prize, \$10 in cash, went to a high-school student: "Look to the future! Prepare for the future! Help save our soil." A housewife took fifth place (\$8.75): "Don't deposit your soil with your neighbor. Keep it home—Bank on it yourself!"

Ten persons received honorable mention.

—WILLIAM BRIGGS.



S. W. Cosby, regional soil scientist, demonstrates how mapping case is used in field.

MAPPING MADE EASIER.—Soil conservation surveyors are going to have an easier job as the result of an ingenious invention by Fred Schlots of Yakima, Wash. The surveyors, who annually tramp over millions of acres of farm land, often work from large aerial photographs about 2 by 3 feet in size. In the field they put, directly on these maps, a variety of information about soil depth, erosion, land slope, and other conditions.

How to carry the photographs without damage and manage them in the field under all kinds of weather have long been knotty problems. Common practice has been to fasten the photos to pieces of plywood or mapping boards. This made a bulky load for the surveyor both in his car and in the field. During windy weather, it was difficult to carry the photos without being blown off course, and nearly impossible to write on them with the high degree of accuracy required. Rainy weather was the final curse. Surveyors had to add a waterproof cover for the photos and map board and even this was not enough to prevent damage since the cover had to be raised whenever information was added.

Surveyor Schlots, who has made conservation surveys of some 23,000,000 acres in Washington and Oregon, has solved practically all of the above difficulties by designing and building a cylindrical mapping case which consists of two aluminum tubes, one fitting inside the other. The inside tube, around which aerial photographs are wrapped, rotates freely on bearings at either end. There is ample clearance to prevent scraping against the outer tube. Schlots cut a rectangular window, 2 feet by 4 inches, in the outer tube. This affords ready access to

the photograph inside and allows plenty of room for writing down survey information in the field. Since photos are wrapped tightly about the inside tube, surveyors have an excellent writing surface. Extra photographs are carried safe from the weather inside the hollow inner tube.

The entire case is fitted with a carrying strap as shown in the accompanying picture. During rain or snow, the case is carried in an upside down position to protect photographs from the weather. When it is necessary to write on the photo, Schlots has found that he can protect the small exposed area by turning his back to the rain or snow and shielding the mapping case with his body. Some surveyors using the case have added a plastic rain flap.

SPARKLING VICTORY FOR CLUB.—The \$500 cash prize offered at the National Sportsmen's show in New York City for the establishment of the best conservation project by a sportsmen's club in 1949, has been won by the Sodus (N. Y.) Rod and Gun Club, a cooperator with the Wayne County Soil Conservation District. The complete conservation plan for 29 acres includes contour farming, cover cropping, crop residue management, strip cropping, tree and windbreak planting, diversions and drainage, and woodland management, protection, and improvement. The plan was made by Richard M. May, SCS zone conservationist at Upper Darby, Pa.

Fairfield Osborn, president of the New York Zoological Society, James Marron and Clayton B. Seagears, State directors of conservation in New Jersey and New York, respectively, were the judges.

The club was nominated for the award by Herbert Dibble, Newark, N. Y., a former president of the Wayne County Federation of Sportsmen's Clubs, who pointed to its activities in successful rearing of pheasants, construction of a large pond for propagation of wild waterfowl, its sending two boys each year to the State conservation camp, maintenance of clubhouse and grounds, building of skeet and trap fields, a fox-trapping campaign, and general enthusiastic support for all conservation measures.

Supporting the nomination were the endorsements of the Wayne County Grange, the Farm Bureau, the soil conservation district, outdoor writers for newspapers, the Northwest Conservation Club of Monroe County, and the Ontario County Federation of Sportsmen's Clubs. In a personal endorsement, Robert Perry, Rochester, N. Y., State district game manager, said the club is one of the most active and cooperative in western New York.





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SECRETARY OF AGRICULTURE

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CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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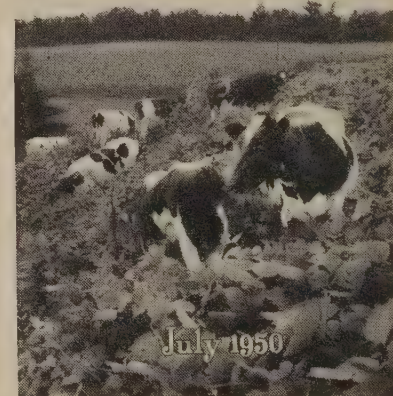
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IDEA: SNOW-MELT STAGGERED.—The principal cause of runoff in the Douglas (Wash.) Soil Conservation District is snow-melt on frozen ground. Observations made in January showed 12 inches of frost under from 12 to 18 inches of snow, indicating that there would be a severe runoff.

Two men who have snow plows on their tractors decided to see if they could induce uneven thawing by plowing strips across their fields. T. R. Hedges covered 90 acres of stubble with strips about 25 feet apart early in February. This work required 3 hours' time. Five days later a strong wind closed all roads in the county except for the one along this field, where no snow moved because of the strips. After 2 weeks of moderate weather, the soil in the plowed strips was frost-free and the ridges of snow started to melt and was taken up by the frost-free soil. The frost-free bands widened daily and this field was one of the very few where no water was lost.

As in the past, special tillage—chisel, duckfoot, and subsoiler—held most of the water, but this field which had the additional protection was the best observed.

John O'Brien used the same idea on some fallow ground but waited until the snow was settling, and this did not remove the frost in time to prevent some runoff, although he feels he had less loss on this piece than on the unplowed fields.



FRONT COVER.—Kudzu is a marvelous plant for steep, rough land such as this tract on the farm of John E. Flora, in Franklin County, Va. Flora has some of the best Holstein cattle in his State. Orin S. Welch took the photograph.

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Soil slip 4 feet deep on Class IV land, hilly topography, south of Colfax, Wash. Wheat is covered by eroded material at foot of slope.

THE HILLS ARE FALLING DOWN

By HUGH HAMMOND BENNETT

THIS year of 1950 I got to see for the first time what I have been wanting to see for more than two decades; that is, erosion in the raw, close up to the violent event—out in the rich Palouse wheat country of Washington, Idaho, and Oregon. Of course, I didn't want to see what I did see, except in the sense of getting closer acquainted with it. I knew about its existence, its effects, and, photographically, about its general pattern. Many times I had seen the effects of erosion in the region but only weeks after the cataclysmic event. I was anxious to see the process in action or right close up to the stage of action.

It was the latter that I saw, along with other things, on my trip to attend the annual meeting of the Pacific States Section of the American Bankers Association at Pullman, Wash. In addition to addressing the bankers convention, I had two good days in the field studying the effects of erosion and examining the progress that is being made in erosion control and prevention; that is, soil and water conservation.

Erosion in the Palouse this year was—farmers and soil conservation district supervisors and soil conservation technicians told me—not so bad as usual. But still there was much too much of it.

It was produced by melting of accumulated snow and by spring rains, mostly in February and March.

The erosion on the steeper lands of the Palouse is generally violent and destructive at this time of the year, especially when the superlative richness of the soil is taken into consideration. The usual expression "severe erosion" does not seem adequately descriptive of the Palouse type. Soil eruption seems more meaningful, or, perhaps, the hills are falling down. Erosion on the rich, silty lands strips the hilltops and ridge crests of the highly productive topsoil and covers up and smothers the wheat on lower slopes with deposits of erosion debris. Really the Palouse type of erosion can better be explained by pictures than by words. So, I am including a few photographic illustrations by way of pictures taken while I was there. (If you look at these photographs, don't forget that nearly everybody out there says: "The erosion this year is not up to par; it's only moderately bad.")

While it is important to know some of the details of the regional types and the extent of erosion, it is the soil conservation program that is most important. Progress with soil conservation in the Palouse is good in some sections and not so en-



Wholesale erosion on "good" wheat lands. Stark tragedy induced by shortsightedness and the desire for quick cash.

couraging in other places. It's spotted that way in some other parts of the country, too.

I drove through several soil conservation districts in company with local farmers, soil conservation district supervisors, soil conservation technicians, and business people. During the morning of the first day out, we stopped 30 minutes "for coffee" at an important town in the Pine Creek Soil Conservation District. Here we were joined by more businessmen and local farmers. The 30-minute "coffee stop" panned out as follows: 5 minutes for coffee and 25 minutes for discussion of soil conservation progress. The coffee was good, and after the talks we drove on to and through the North Palouse Soil Conservation District, joining up with additional conservation supervisors, farmers, businessmen, and bankers.

We made a number of stops along the road to see and discuss what was being done and what was not being done about soil conservation. For example, at the Hoffman brothers' farm, near Rosalia, we saw some really excellent effects of sound soil conservation. There was no erosion of any consequence that we could find on the farm, and the wheat yield for 1949 was over 45 bushels per acre—and it was not considered an extra good year

for wheat. On some farms where there was no evidence of any soil conservation of any kind, we not only found much severe erosion but the 1949 wheat yield in one instance was reported as averaging less than 20 bushels per acre.

In the North Palouse district we saw much good soil conservation work and, along the way, conspicuous road signs bearing novel suggestions for getting ahead with the soil conservation job. These roadside signs, I was told, represent the efforts of Banker Charles Funkhouser of Palouse, an ardent conservationist.

In too many places, however, we saw steep slopes streaked with this year's erosion rills. These were, for the most part, 6 to 8 inches deep and 8 to 10 inches wide; some, unfortunately, were 2 feet deep. All of them were ghastly reminders of what goes on each succeeding year, especially in fields of winter wheat planted on summer fallow with part of stubble plowed under and in fields where all the stubble had been plowed under so that it could have no possible protective effect on the surface of the land.

But what looked worse were the accumulated results of the annual erosion—waste of soil reflected in the expanding spots of erosion-exposed

yellow silty-clay subsoil. In some of the more hilly sections at least half of the land consists of such exposed subsoil. These areas, we were told, often produce no more than 10 or 12 bushels of wheat when neighboring lands still retaining the dark-colored topsoil, or part of it, produce 30 to 45 bushels or more per acre. We were told, also, that originally many of these eroded lands under uneroded virgin conditions turned out 50 or 60 bushels of wheat per acre, sometimes 70 bushels, without fertilization or crop rotation.

In the Palouse, representing some of the world's most productive wheat land and powerfully good pea, grass, and legume land, erosion is a double-edged tool of soil impoverishment. It not only strips off the rich topsoil, exposing relatively poor subsoil, but, as already noted, the eroded soil when deposited on lower slopes smothers out considerable wheat. The erosion first washes off the rich topsoil and then proceeds to cut into exposed clay subsoil, thus continuing to deposit smother-



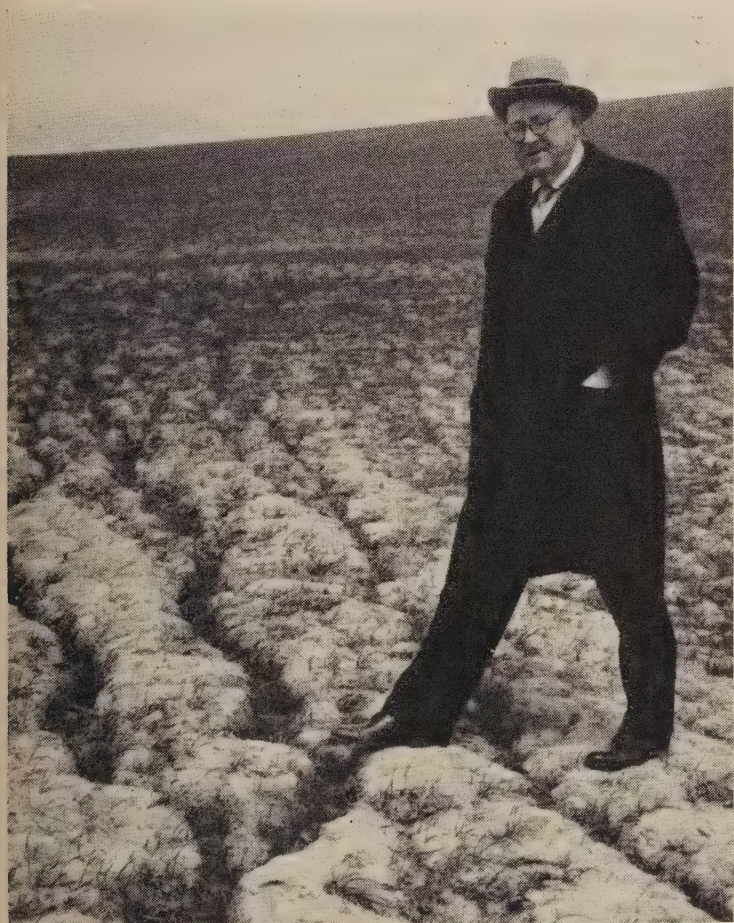
White spots are where the subsoil is showing through as result of erosion. This is 8 miles south of Pullman.

ing material over the lower slopes. At this stage the deposited material is more clayey and does a better job of smothering out wheat—if the word “better” can be used in connection with such a process of land damage.

Next day we drove through a very hilly section northwest of Pullman, comprising something over a hundred thousand acres of land of capability Class IV, according to the reconnaissance soil conservation survey of the State. Because of steepness, most of this land is highly susceptible to erosion and the north slopes are subject to severe damage by soil sliding. Generally speaking, Class IV land in such country should be used most of the time for grass, legumes, or grass-legume mixtures. Probably a more detailed survey would show that some of the land is even steeper and less amenable to cultivation than Class IV. If it is, it should be kept in grass or grass-legume mixtures. Such a survey would probably show, also, some Class III land and perhaps even Class II, both of which can be cultivated safely under good soil conservation practices.

What was so distressing in this locality was that nearly all the land was being used for wheat, most of it without any semblance of soil conservation except that there had been very little burning of the wheat stubble and in an occasional field part of the stubble had been left on the surface of the ground and part plowed under.

Some of the soil conservation technicians accompanying us complained of the difficulties they had encountered in trying to get these lands protected. They said that just about everything that was done along the line of land use in the area had combined against the establishment of protective soil conservation measures. It seemed the truth of what they said was visibly demonstrated in every field except the few where not all of the crop stubble had been turned under. My rough



This is an example of the result of burning stubble and summer fallowing in an area where rainfall is sufficient for annual cropping. This field was seeded to winter wheat in the fall of 1947. It did not make sufficient growth to provide any appreciable amount of protection. The Chief's dour expression shows what he thinks of this kind of farming.

estimate was that at least 80 percent of the land had been affected by erosion or north-slope slides this year, and part of the remainder had been damaged by deposition of material washed down from above. Something like half of the land had been eroded down to or nearly to subsoil and now this is being cut into by continuing erosion, with damaging deposits of silt-clay products at the foot of slopes.

I was told that some agriculturalists are advocating that erosion in such areas be allowed to continue, without attempt to stop it until the land is literally forced out of cultivation. At this stage, these advocates say, soil conservation work should begin.

My only comment to this is that such practice, if generally followed, would lead to rapid national decline.

About all I was able to suggest, offhand, about the use of these very hilly lands was not to give up—certainly not before every possible method of approach for improving the situation is exhausted. I pointed out that what seemed most promising now is to make the best possible use

of the educational process, especially through the employment of the neighbor-group approach for soil conservation. Our technicians in the Soil Conservation Service have recently learned much about ways and means of making use of this new and promising method of inducing more land-owners and operators to adopt at once effective soil conservation practices, to be applied according to land capability and need.

In these more difficult situations—and in all situations—I have great hope that the group approach will prove helpful right here in this locality. I think arrangements can be speedily worked out to go ahead with this method, which may be the only possible way for saving such land. In the meantime, the area should be surveyed in detail to determine precisely what lands can be cultivated, what should be used most of the time for grass and legumes, and what should be used all the time for grass and legumes.

There has been a combination of causes leading to the loss of soil and water in the Palouse, but to a considerable degree I think too many who have advised as to how the land should be used see the



This is the type of fall plowing recommended for the Palouse where peas or any other spring crop follows wheat. The furrow slice is set up on edge, the stubble being partially covered. Rough plowing and stubble have proved effective in controlling erosion.



Fall-disked winter wheat stubble on surface—3,500 pounds to the acre—solves erosion problem on this slope near Steptoe, Wash., in spring of 1950.

situation from the wrong point of view. They seem to base their conclusions—and advice—on what is called *the cost of controlling erosion*. This, of course, is highly important; but it seems to me that in situations of this kind *the cost of not controlling erosion* may be even more important. When just the cost of controlling erosion is considered, I am afraid something very important is overlooked. By considering the problem from the angles of both the cost of controlling erosion and the cost of not controlling erosion, I am convinced that results will be better. I am not at all sure, however, it is going to be easy to get very far with this because of the difficulty of getting the idea understood by those who have worked so long from the point of view of controlling erosion after it has started rather than preventing it before it has started. In practice we have to do both, of course; but for various reasons the problem is not quite that simple.

Perhaps what happened in the Palouse in the heavy erosion year of 1948 would help to clear up what I mean. That year, according to 1,200 measurements of the effects of erosion made by Soil Conservation Service technicians cooperating with the technicians of Washington State College, it cost on many farms 20 bushels of rich Palouse soil to produce 1 bushel of wheat. That much soil was

washed out of wheat fields of many farms for every bushel of wheat that was grown, according to the study. If the price at which topsoil is commonly sold by those who sell topsoil—that is, \$1 a bushel—is accepted as the value of a bushel of topsoil, then the cost of wheat produced on these farms in 1948 was \$20 worth of topsoil to produce \$1.50 worth of wheat. I am not saying that \$1 a bushel is a proper value for topsoil; I don't think it is. I can't suggest how any true money valuation of a resource that stands between life and death or between national welfare and national decline can be arrived at. But for the purpose of illustrating the point of cost of not controlling or preventing erosion, or doing both, this method of appraisal may have some place in developing our thinking about proper land use and protection in the Palouse country.

And there is still another way of illustrating this point of the cost of not controlling and preventing erosion: According to measurements and observations in 1948, the soil equivalent of sixty-six 80-acre farms went down the Columbia River every day for a month during the high tide of heavy rains, destructive floods, and disastrous erosion.

The erosion of the lands that produced most of the flood water of the region in 1948, and

brought death to many, did not make the headlines in the news. It was the damage caused by the floods, and the loss of life, that was emphasized in the news reports. My own estimate is that, not considering the cost of life, the erosion damage was much greater than the flood damage. Soil erosion is not nearly so spectacular as floods, even if it is more destructive; but the full effects of erosion do not stop with the damage to the land. After the mellow topsoil is washed off down to relatively impervious clay, most of the rain water flows rapidly off the land to add volume to floods; and, in addition, great quantities of soil are carried into the channels of streams to fill up reservoirs and do other damage.

There is not space here to tell all of what I saw on this recent trip to the Palouse. Perhaps I can complete the story later on—we took samples of deposited topsoil material and of erosion-exposed subsoil to determine in the laboratory how much organic matter washed off the lands of the Palouse and how much more clay is now going down the slopes to cover the rich colluvial and alluvial lands of the lower slopes and stream bottoms. And, furthermore, the yields of wheat on both subsoil and deposited topsoil by the coming harvest will be needed to complete the story I have started to tell.

And there is still another matter: The same types of good forward thinking, along with, probably, some fallacious thinking, which I have set down here, is going on pretty much throughout the United States. I set them down on the train returning from Washington State to Washington, D. C., from my field notes and observations and from reports that were made to me in the field. There is no thought of casting any stones in the direction of the Palouse country; rather, the intention is to get the minds of men more accurately focused on the soil conservation problem. More people can help with the job, not only in the Palouse but over the Nation and around the world.

Soil conservation is the most important job facing the United States—and the world. We have a great nation. We are going to keep it great through adequate defense from both armed attack and unarmed attack. I mean that we are going to defend ourselves from military invasion and from soil erosion, disease, and any other influences that would undermine our American way of life.

DISTRICT PROFILE

WEBB
of
WASHINGTON

At the ripe old age of 43, R. B. "Bob" Webb, of Skamokawa, Wash., has earned distinction as one of the Pacific Northwest's "elder statesmen" of soil conservation.

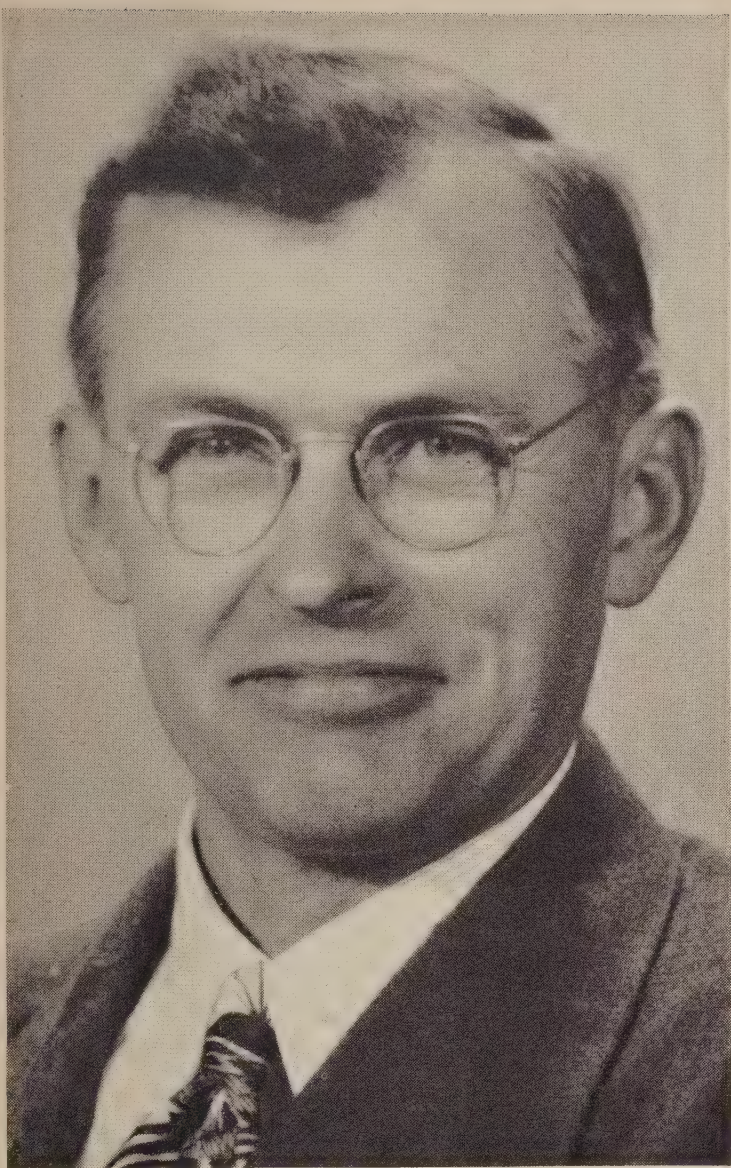
The role is well justified. Youthful Bob Webb has held most of his State's positions of conservation leadership. His advice and counsel are sought throughout the Northwest and elsewhere by men many years his senior.

Since 1948, Webb has been president of Washington's dynamic State association of soil conservation districts and chairman of his own local board of district supervisors. This year he stepped down from the presidency of the State association to accept membership on the State Soil Conservation Committee. Webb announced, in accepting the job, that his principal aim would be to help bring every acre of farm land in Washington within the boundaries of a soil conservation district.

Bob Webb believes sincerely in the democratic concepts of the districts. Throughout his term as president of the State association, he kept urging local supervisors to assume greater initiative and responsibility in getting conservation measures on the land. His powers of persuasion were strong. Few States can boast of more active or independent-thinking supervisors than Washington, nor of finer working relationships between districts and State government.

For many years, Washington, like many other States, paid little attention to the work of soil conservation districts. Webb believed that responsible State officials should know what was going on in the districts and that they should offer more than words of encouragement to local supervisors. He carried his case directly to the Governor who promptly agreed with every point he made and took immediate steps to place the resources of the State government behind districts.

As a result, Washington is today one of the few States with a full-time soil conservation liaison officer whose job is to find out what kind of help



R. B. Webb.

districts need from their State government and to see to it that they get the help from the right department at the right time. At the Governor's urging, the legislature also acted to grant soil conservation districts, on a matching basis, up to \$10,000 of State funds for flood control and related conservation work.

Bob Webb's mild, almost retiring, manner is somewhat deceiving. His natural reserve disguises a mastery of all the intricate, technical details of soil and water conservation, a knack for diplomacy, and an unusual capacity for getting people to work together.

Webb's grounding in the fundamentals came as a working technician of the Soil Conservation Service in southern California. For nearly 5 years, he served both as an agronomist in designing and installing conservation measures and as an administrative officer charged with encouraging farmers to join together for group action. Re-

gional Director J. H. Christ recalls that Bob Webb had a special facility for understanding the problems of farmers and an engaging way of leading them to appreciate the benefits of conservation. Webb's services as a conservationist was preceded by 5 years of study at Oregon State College which earned him B. S. and M. S. degrees in farm crops, a year of teaching at his alma mater, and several years of applied research on agronomic problems at the Moro Branch Experiment Station in eastern Oregon.

In 1942 Webb resigned from SCS and engaged in dairy farming in Wahkiakum County, Wash., on the banks of the lower Columbia River. He keeps a herd of 25 to 30 milk cows, predominantly Guernseys, and supplies all their pasture and hay on the farm. The Webb farm is, of course, completely under conservation. Bob speaks from personal experience when he says, "Good conservation farming pays, as I have found from pasture rotation, the seeding of conservation grasses and legumes, weed control, and the use of barnyard manure and commercial fertilizers."

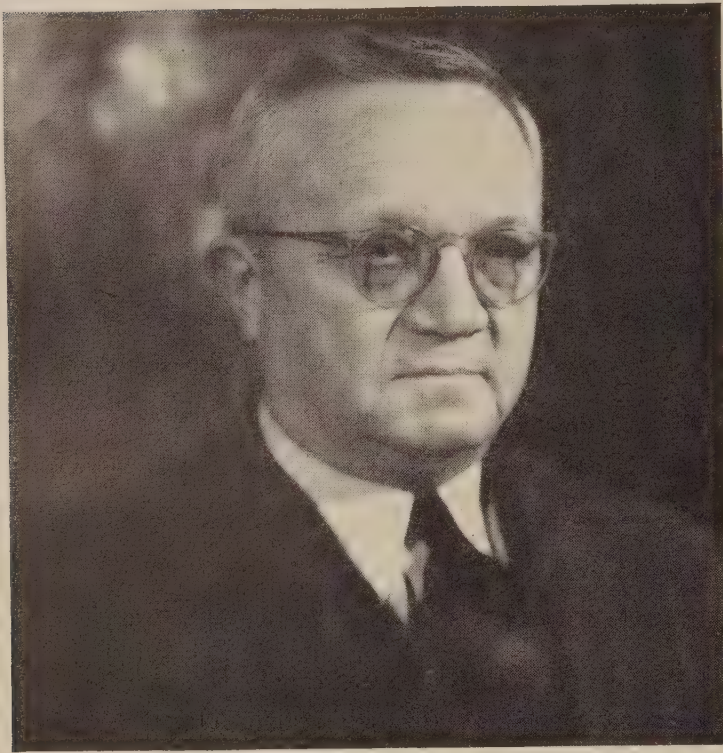
Shortly after his arrival in the valley, Webb joined the local grange, the community church, and various civic organizations. But "soil conservation is my first love and most of my extra efforts are in that direction."

During our conversation, Webb mentioned that he did all of his own work with the exception of help he received "from a high-school freshman and his two younger brothers." Mrs. Webb later called me aside to explain that, "Old Professor Webb is getting forgetful. The high-school freshman he speaks of is his eldest son. He also has a daughter and two small sons. He was married in June of 1931 and naturally I was the gal he married." Mrs. Webb's gracious charm belies her ability with a typewriter. During his two terms as president of the State association, Webb received and acknowledged scores of letters monthly. Mrs. Webb served as his secretary. She too is an authority on soil conservation in Washington.

—WILLIAM L. SOUTHWORTH

READER FAMILY GROWING.—The West Virginia State Soil Conservation Committee has subscribed to SOIL CONSERVATION Magazine for each soil conservation district supervisor in the State.

THESE ARE SOME OF THE MARKS OF PROGRESS



By J. W. SARGENT

THE march of progress in Southeastern agriculture is almost fantastic. Advances in production of food and fiber—due in no small way to improvement in land use and treatment—border the unbelievable. The particular reason? That covers a broad front including research, marketing, processing, transportation, machinery and equipment, land use and treatment, seed, and fertilizer.

Whatever the advances along the whole front, they are due largely to the development and use of scientific knowledge to meet the problems of our day. We might do a little bragging about progress, but there is danger in complacency. There is no reason for leaning on our oars. The job of adequately clothing and feeding all of our people and helping clothe and feed the people of the world is a tremendous task. We now know it is unwise to exploit and abuse our resources to meet current needs.

Let's narrow our field of thinking and review progress made during recent years in a few phases of agriculture in which most of us are vitally in-

terested. I believe they are good indications of what is happening all along the line.

The upward trend in the production of seed of grasses and legumes needed for land improvement and forage is noteworthy. In the early forties only a few thousand pounds of Suiter's grass (Kentucky 31) seed were available. In 1949, more than 10 million pounds of this valuable grass seed were harvested in soil conservation district activity. That meant that 100,000 acres of land where this grass was needed for soil conservation and pasture could be seeded in 1950. This 10 million pounds of available seed; plus much more of which we have no record, was exhausted by early March 1950. Think of it! An increase from a few pounds to 10 million or more in less than 10 years.

Take another example. In 1935, there was one 2-pound packet of blue lupine in the United States. Although lupine has been grown in the Orient for 2,000 years, no progress had been made in the use of this crop in our country. Largely through soil conservation district activity, more than 50 million pounds of blue lupine seed were harvested in the spring of 1949. This may mean an end to the ever-increasing dust storms in the peanut belt of the Southeast.

Increase in the use of Caley-peas, sometimes called wild winter peas or Singletary peas, is impressive. Alabama and Mississippi alone now produce several million pounds of this seed annually. In at least two of the soil conservation districts of Alabama, farmers harvested about a million pounds of this seed in 1949. It is a valuable grazing and soil-improving plant which, with proper management, is self-perpetuating.

Sericea, sometimes referred to as poor-land alfalfa, was scarcely known 15 years ago. Last year farmers in soil conservation districts in Georgia, Alabama, and the Carolinas harvested nearly 15 million pounds of sericea seed. Not only does it provide good grazing but, with good management, is a valuable hay crop well suited to rough land conditions.

Crimson clover is not a new crop, but it has recently increased and spread into new territory. Alabama soil conservation farmers harvested in

NOTE.—The author is assistant regional director, Soil Conservation Service, Spartanburg, S. C.

excess of 10 million pounds of this seed last year. Georgia farmers produced even more. One county in Alabama—Autauga—produced almost 1 million pounds of this seed last year, mostly the reseeding strain.

Annual lespedeza, for all practical purposes, was introduced in the Piedmont section of the Carolinas by the Soil Conservation Service. A surplus of seed was harvested last year in the Carolinas, Virginia, and Tennessee.

There has been a substantial increase in the amount of all the white clovers, particularly Ladino, and in buttonclover. Other soil-conserving crops which fit into a better land-use program have spread rapidly during recent years.

The districts and the Service have had a lot to do with a more extended use of some 20 previously unused crops in this region. They include bicolor lespedeza, hairy indigo, Pensacola Bahia, Pangola, kudzu, crotalaria, Coastal Bermuda, ryegrass, and we have been instrumental in a far more extensive use of Dallisgrass, orchardgrass, alfalfa, and pine trees.

Let's take a look at the soil-amendment materials—fertilizer and lime. During 1948 the soil-amendment industry produced some 40 million tons of fertilizer material for use on the land. Forty million tons will load a string of freight cars—30 tons to the car—reaching three times across the continent from New York to San Francisco. But the most significant thing in this connection is not the amount produced or consumed, but how it was used.

Ten years ago most material of this kind was used on row crops. Now more than 50 percent of it is used on grasses and legumes to improve grazing and soil conditions. We have actually begun to exchange fertilizers and minerals with the soil for grasses and legumes in a better agriculture.

As to farm equipment, our contribution has to do largely with its use. Forty years ago there were about 2,000 farm tractors in the United States. Thirty years ago the number had increased to about 200,000. In 1949, it exceeded 2½ million. In that same year there were 14,000 contractors in the nine Southeastern States using improved types of farm equipment to assist soil conservation districts in getting conservation measures applied to the land. Ninety-five percent of this type of work that was "hired" done was done

by farmer-contractors. The replacement value of this equipment alone was \$220,000,000.

But some will ask, "What is the value of all this? What is it worth to have an abundance of planting seed and fertilizers and farm equipment?" The answer is: There is no value in these things without soil and soil fertility. These do not constitute the big advances.

One thing to which we point with pride is the scientific use and treatment of the land. That's where Soil Conservation Service employees have made their big contribution, that is, in determining the capability of various lands and building a soil conservation program on them, not only with available materials and labor, but also to suit the land conditions. More than 300,000 farmers in these nine Southeastern States have seized the opportunity to use these principles in advancing the agriculture of this region.

Answers do not always come easy, but we work hard to get them. Take one example—Delta land in Mississippi looks flat, and apparently there should be no serious erosion problem. However, C. G. Nichols of Greenwood and the Soil Conservation Service technician assisting him knew that there was not only an erosion problem but also a problem of drainage. They tried a few things that seemed promising. They were seeking answers that were not in the book. They now refer to the answers they found as a system of row arrangement. It is really more than that. It clearly delineates areas of land for definite uses. It makes rows longer, fields larger, holds water, and prevents erosion of slight slopes while taking excess water off flat, wet land.

I am sure that there will not be in our time a 100 percent soil and water conservation program allied to the farm lands of our country. But we know that there are certain phases of this program, mainly land capability and use, that should be completed within a period of a very few years. This information is needed not only as a basis for all agricultural programs, but also as a guide in industrial development.

We want to finish that job. We also know that in the matter of applying needed soil conservation measures to the farm lands of this country a large part of that job should be completed within a period of 20 years. It costs a lot less to do it now than it will cost a few years later, and then we avoid the risk involved in putting it off.

BUTTONCLOVER, ANOTHER OF THE GREAT NEW PLANTS

By BARRINGTON KING

FARMERS in the northeastern and northwestern Alabama soil conservation districts are pushing another new plant in the long list of those that are helping to revolutionize Southern agriculture.

Buttonclover (*Medicago orbicularis*) has made such phenomenal progress as a reseeding winter legume on cropland in the vicinity of Huntsville for the past few years, that the Alabama Buttonclover Growers Association celebrated with a buttonclover festival in April. After seeing a lush growth of the new plant on tours of several farms during the day, visitors from several surrounding States heard its virtues extolled at a dinner in Huntsville that night.

One reason farmers in the Huntsville area like buttonclover is that it lies close to the ground and

provides good protection against erosion before the stand gets crowded and starts its upward growth. In fact, visitors were told during tours of the Forrest Bell and J. M. Hereford farms that it covers the ground with such a dense mat that "a snake will crawl on top instead of under it." Another advantage is that "it will wait for you to harvest seed."

One of the problems in machine harvesting of buttonclover has been the difficulty of getting the seed of the recumbent, mature plants off the ground with a combine. Development of a pickup reel, which was on display where the tours converged for refreshments during the afternoon, has eliminated this difficulty, it is said. Some of the growers reported harvesting seed as late as the Fourth of July and reported that about 97 percent of the seed are hard after going through a combine.

The high percentage of hard seed produced by buttonclover makes it possible to get a volunteer

NOTE.—The author is chief, regional division of information, Soil Conservation Service, Spartanburg, S. C.

Beef cattle grazing first-year buttonclover on farm of A. D. Sample, supervisor of Northwest Alabama Soil Conservation District.





Visitors from several surrounding States attended the Buttonclover Festival in the Northeast Alabama Soil Conservation District last spring.

crop for 3 to 5 years from one seed crop left on the land. This makes it especially valuable in crop rotations. Its value as a winter grazing crop was observed in several fields which had provided grazing from October to April for one cow to the acre. The farmers said they would still get a seed crop from the same land.

Gen. Edwin Jones, president of the Alabama Buttonclover Growers Association, who presided at a dinner, told how buttonclover got its start in the Huntsville area as a result of a visit to Tennessee by two local Soil Conservation Service workers who were impressed by possibilities of the plant. He said the two men wouldn't let up until they got farmers in the Northeast Alabama Soil Conservation District to try it.

"We think it's the best cover crop for row-crop land," General Jones said.

Dr. L. R. Neel, editor of *Farm & Ranch-Southern Agriculturist*, who did some of the early work with buttonclover as superintendent of the Middle Tennessee Experiment Station, emphasized the importance of cultivation to prepare a seedbed to enable buttonclover to reseed, and also stressed the plant's heavy lime requirements.

"A farmer can have 7 months' pasture from buttonclover and still get a seed crop," Dr. Neel said. "He can run buttonclover in rotation with corn 2 years out of 3. We know it has withstood a temperature of 17° below zero. One upland field has grown 8 years without any disease showing up. And we know that cattle, sheep, and hogs like it."

John Ewing, assistant director of the Tennessee experiment stations, reported that buttonclover is of European origin and was first found in this country in Wilson County, Tenn., following the visit of a circus to Lebanon. He said the crop requires soil of high fertility and needs inoculation. A special buttonclover culture is available commercially.

Ewing said buttonclover is one of the most palatable of winter crops and does not bloat cattle to the extent that some of the other clovers do. It requires cultivation for effective reseeding and is not suitable for permanent pasture. He said farmers can save up to 500 pounds of seed to the acre.

Several of the speakers pointed out that buttonclover is but one of many new soil-conserving, soil-building plants that, together, are working wonders in Southern agriculture. It was brought out that buttonclover is not adapted to conditions in all parts of the Southeast.

L. B. Scott, SCS regional nurseryman, said that another new plant, *Medicago obscura*, a close relative of buttonclover, had done well in the Service nursery at Brooksville, Fla., and might have possibilities in other areas. He discussed the seed-increase program of promising new plants in Service nurseries, including buttonclover, which has been in production at the Chapel Hill, N. C., nursery since 1937.

(Continued on page 279)

COLORADO'S DYNAMIC BILL CASSELMAN

By NORRIS A. JACKSON

FOR a man who once was definitely opposed to farmer cooperatives, you'd think that Bill Casselman never would have allowed himself to be linked with a soil conservation district.

But the present ramrod of the Colorado Association of Soil Conservation Districts knew what he had been looking for when a group of farmers approached him 7 years ago with the idea of forming a soil conservation district for the Mosca and Hooper communities in south central Colorado.

To look at Bill, who registered as Loren B. Casselman at the University of Nebraska over a quarter of a century ago, he's another farmer. To hear him speak, to watch his expression and the way he operates, he's a high-powered conservation salesman.

Perhaps that's the reason the temporary State board of supervisors chose the mild-mannered but forceful farmer-dairyman from Mosca to represent the Mosca-Hooper district when the State association was formed. It's definitely why they elected him president in 1949 and again in 1950.

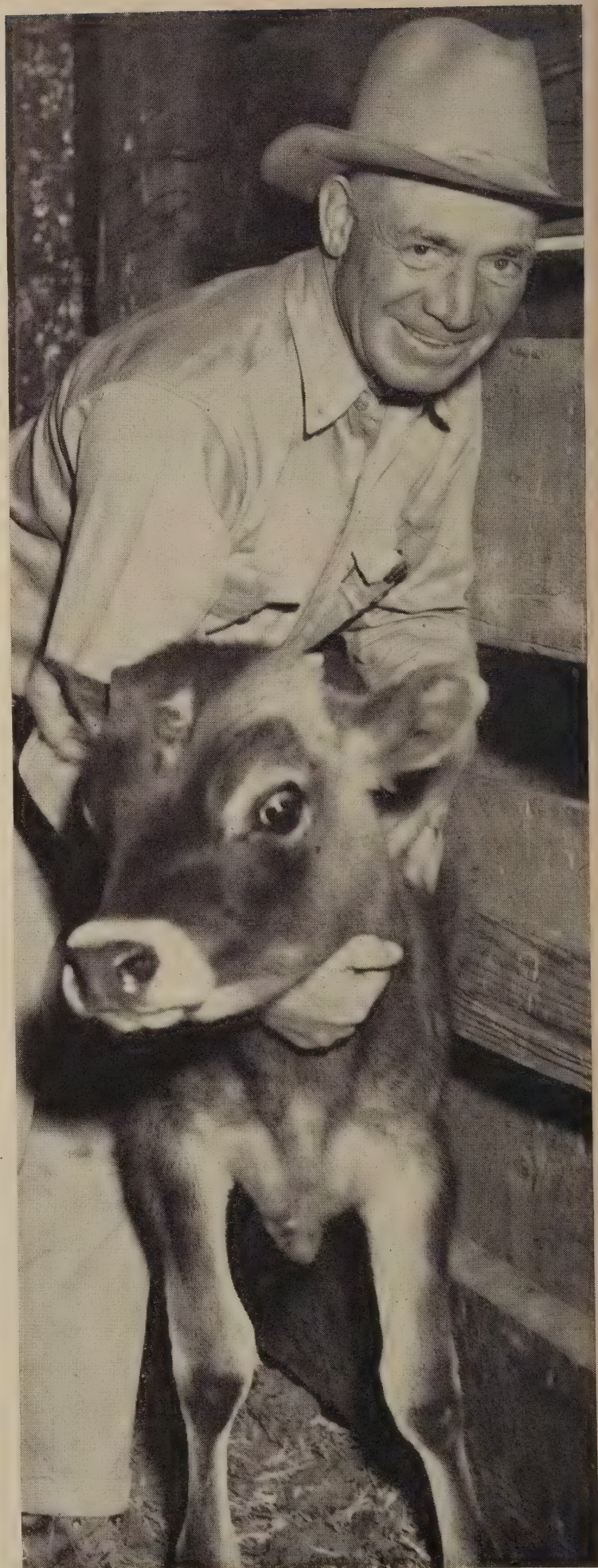
Bill's work with the district started early in 1943. The district was voted in May, a scant few weeks later.

Bill was elected secretary-treasurer, a position he still holds. In 1946, the supervisors hired him part time as secretary-manager to handle the district's financial interests. In March 1950 they decided he should receive pay for duties that absorbed his full time.

Directing activities of equipment valued at \$35,000 is no small task. Under his supervision, seven men operate tractors, bulldozers, power shovels, draglines, scrapers, ditchers, and land planes for cooperators within a 192,960-acre area. Annual business exceeds \$50,000.

There's also the matter of running the 80-acre district-owned farm, which was bought 2 years ago and reclaimed from brush land as an experimental farm for the southern end of the San Luis

NOTE.—The author is information and editorial specialist, Soil Conservation Service, Albuquerque, N. Mex.



Bill and registered Jersey bull calf "Selby."

Valley. A portion of the farm is assigned to 4-H clubbers for use in their projects. The farm is the first in Colorado to be district-owned and one of the few in the Nation.

As president of the State association, one of Casselman's pet accomplishments was the organization of the State into watershed districts. Built of local soil conservation districts, the watershed organizations act as clearing houses for the State group. They settle differences between districts before they reach the State body.

Each watershed district is ruled by a board of directors made up of two members of each local district within the watershed boundaries. There are seven such watersheds in the Mountain State, although only five are organized.

Farmer-cooperators in the State also approve his method of operating the State group: They commend him for letting them direct the local supervisors, who, in turn, kick the pants of the watershed directors, and so on up the ladder. The situation is a marked contrast, and in direct reverse, to some State organizations.

His family is one that eats, sleeps, and drinks soil conservation. When the Mosca-Hopper district was formed, the supervisors hired Bernice, Bill's wife, to keep books. Her system supplied the pattern for the State bookkeeping method.

Mrs. Casselman travels constantly with her husband and takes an active part in meetings. She was the first person upon whom Bill called for assistance when he was elected president of the State association last year.

Then there are his daughters: Mrs. G. B. (Patty) Ryan, who talked good farming before and after she graduated from high school; and Carol, who took her sister's place as salesman to the students. Coming up are granddaughters Bonnie, 5; Cathryn, 3; and Jacque, 1.

Casselmann's home district nestles in the San Luis Valley between the Sangre de Cristo Mountains and the Continental Divide. When he came to the valley and his father's 160-acre farm shortly after World War I, the principal crop was alfalfa. Now orchards and cannery crops dot the landscapes and share prominence with feed production. New irrigation methods are a main interest.

During the last three decades, farm people of the area have seen Bill serve most of the time on the local school board, and recently they saw him act as one of three judges in a State-wide soil con-

servation contest sponsored by the *Denver Post* and radio station KLZ of Denver. He is also a member of the board of directors of the Rio Grande watershed district.

Bill has a zest for conservation and a love for the soil—a sound formula for a top man in a top industry. He doesn't hold a university degree, but when a new farm problem arises in the State, the first thought is to "ask Bill."

BUTTONCLOVER

(Continued from page 277)

L. L. Self, district extension agent, pointed out that no one crop will solve all the cover and grazing needs. "It's fine to study all possibilities," he said. "We should know the crop before we say to a farmer, 'This is the plant for you.'"

Recalling that during the morning tour the group had seen 750 acres of Kentucky 31 fescue on the G. W. Jones & Sons farm, operated by General Jones and his brother, Carl, the speaker said, "Many years ago we had several failures with fescue and decided it was not suitable as a major crop. Today we'll agree with you that it is."

W. G. Simpson, assistant State conservationist of the Soil Conservation Service, referring to the tours that preceded the dinner, said:

"This has been one of the most heartening days I've had in 25 years of professional agricultural experience. I can remember when it was a long jump between green fields in Alabama at this time of the year. Today it is hardly possible to get out of sight of a green field in this State."

J. C. Lowry, extension agronomist, pursued the same thought. "This is a part of a new day developing in Alabama and the Southeast," he said. "We've worried too long about our problems without realizing our advantages. But a spirit of optimism has developed, a kind of alertness."

"It's going to take a lot of seed to do the job. I can remember, about the time of the depression, when there wasn't a single seed processing plant in Alabama. At the beginning of this year there were 72. There has never been anything in the history of the State like the green cover crops we have today."

VO-AG BOYS GET DOWN-TO-EARTH TRAINING



Arriving at teacher's farm, the boys grab standard equipment from SCS truck and prepare for work. Technician Roy E. Ballard is at left; vo-ag instructor Champion Coles at center.

By **ROY E. BALLARD**

THE Salem (N. J.) High School, cooperating with the South Jersey Soil Conservation District and Soil Conservation Service technicians, is demonstrating how vo-ag conservation farming projects can help to establish good land-use practices on district cooperators' farms, and at the same time build a younger generation of conservation farmers for the future.

A group of 75 boys, nearly all from farm families, is taking the training under the direction of their supervisor, Champion Coles, who operates the farm where the class work is done, and the SCS conservationist who heads the Salem County work unit. The boys are in classes with as many as 30 members. When they go to the fields, at least two or three times a month, to lay out strip cropping, they usually work in groups of three. The units increase when they do other work, such as drainage.

Classroom studies, preliminary to field activity, include the presentation and discussion of general soil information with its local applications, and a demonstration of equipment used in laying out

conservation practices for establishment on the land. Through the actual handling of such instruments as a simple hand level, and the use of blackboard sketches, the methods used in laying out contoured strip cropping, drainage, diversions, watercourses, and farm ponds are taught. Pertinent terms are carefully defined so that there will be a common language for work in the field.

The first field activity is at Coles' farm. One boy takes the hand level, another a stake and hammer, and the third carries extra laths. As they move over the fields they exchange duties so as to spread the experience.

In due course, class members are put through a test to determine their accuracy. Two teams of three each are started at separate reference points on opposite sides of a 30-acre field that is to be laid out for strips. Unknown to all the boys is the fact that the reference points are located on the identical contour. If they do the job correctly, the two groups will meet head-on in the center of the field. Should they not meet there, they are sent back to the starting points and are made to repeat the process until they do meet at a common point. Discussion of problems, methods, and results follows.

NOTE.—The author is work unit leader, Soil Conservation Service, Salem, N. J.

As soon as the boys have become sufficiently adept, they are transferred to a district cooperator's farm where a real strip-cropping system is to be installed. Today, perhaps, they are to work at the Joseph DeMaris farm in Alloway Township, with their instructors and DeMaris checking every step.

When all strip boundaries have been located to the satisfaction of instructors and cooperator, DeMaris brings his tractor and plow into the field and, with the boys as observers, plows in the contour lines, his start in application of the practice. The boys collect the laths they used to mark the lines and prepare to move to another project.

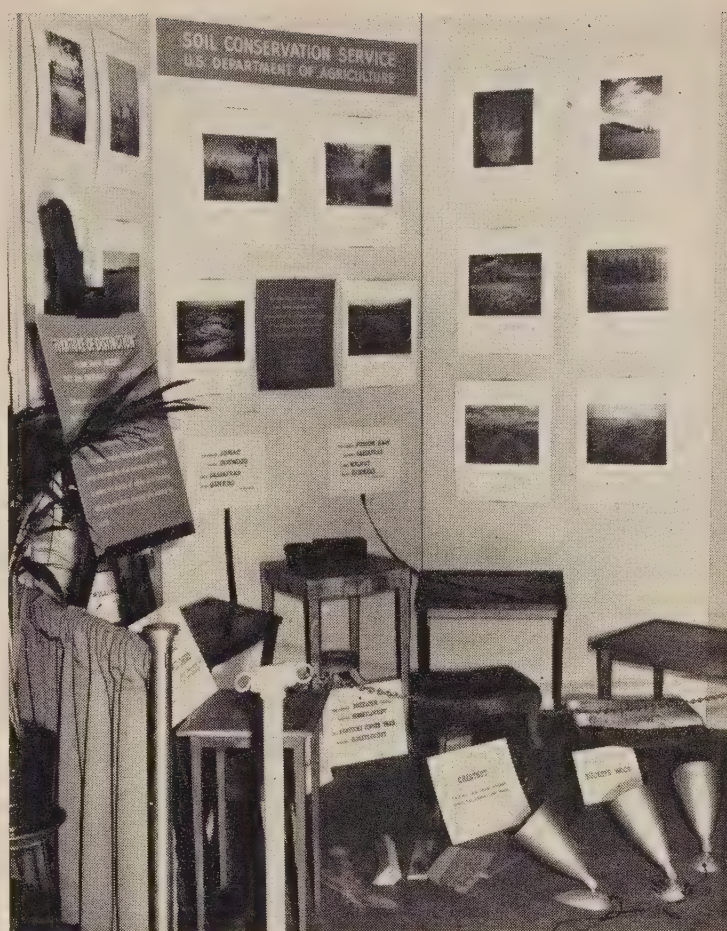
The reaction of the boys to this type of project has encouraged Herbert K. England, superintendent of schools; Thomas J. Griffiths, his assistant; and Miss Marie L. Oehrle, high-school principal, to authorize expansion of training in soil and water conservation and good land use. Every vagabond boy will have training and experience with all of the correct farm practices in the area.

The instructors observe that the boys' interest in their conservation studies is having an immediate effect on operations at some of their parents' farms. This leads to the belief that many of the boys will be full-fledged conservation farmers when they begin to operate on their own or take over their parents' farms. And among those who may not become full-time farmers there are some, the instructors say, who already have indicated that they want to become technicians with SCS or some other agency that works with the soil conservation districts.

FINE FURNITURE FROM WASTEWOOD

By GLENN K. RULE

MANY people pass by, throw away, or burn various wood materials that have unique possibilities when skillfully fashioned into articles of household utility. Many trees are cut down and burned because they don't classify as commercial. These come from ornamental and fruit-bearing plants, from small-stemmed species that are strangers to sawmills, and from soft woods not commonly used. The latter are customarily burned on the spot or are piled to rot in farm-



land clearings, without being considered as even worth hauling for fuel.

Hugh Bennett, America's top soil conservationist, is, however, constitutionally opposed to waste of any sort. He dislikes the misuse of fire and ax and saw, believes in as close an approach as possible to total conservation not only of the land but of the products of the land—and minerals and metals, as well. In his rural home near Falls Church, Va.—and in his Washington office—the Chief has a rare collection of stools and tables, patterned from a wide variety of woods of the odd-lot category. They are exquisite and varied in grain, coloring, and detail of finish. In them are achieved novel and beautiful effects usually beyond the range of ordinary commercial pieces. They are mostly small pieces prized by the Chief primarily because they show what can be done with woods that customarily are rejected and destroyed.

Lilac, for example, yields a beautifully colored, velvety border for small tables. Dogwood keeps it company. Even pawpaw and sassafras get their innings, in the hands of a skilled cabinet maker. And possumhaw, artfully worked into a table top, achieves an effect worthy of its intriguing name.

At the great flower show recently held in Washington's armory, booth 14 was one of the major attractions. It was labeled "Furniture of Distinction," and it featured pieces from the Bennett collection—handsome pieces made up of such woods as chokecherry, lilac, willow, sumac, dogwood, sassafras, ginkgo, boxelder, honey locust, Kentucky coffeetree, pawpaw, buckeye, chestnut, mesquite, and river birch. These normally spurned woods came from many States: the buckeye from Ohio, the lilac from New York, the willow from South Carolina, chestnut from Virginia, boxelder and possumhaw from Indiana, Kentucky coffeetree from Kentucky, sassafras from North Carolina, ginkgo from Washington, D. C., mesquite from Texas, and sumac and chokecherry from the Chief's place in Fairfax County, Va.

Some of the articles in the exhibit are of historical interest. The chestnut milk-stool came from an ancient fence rail which the Chief picked up on Peter Jefferson's place near Monticello. He doesn't claim that either Thomas Jefferson or his father split this particular rail, but he knows it was a very old rail, probably of the kind that was commonly used in the worm fences of early America. The ginkgo stool was fashioned from a tree which once stood on the site of the present Department of Agriculture.

The Chief still can scarcely realize that such a beautiful table could actually be made of willow, which farmers normally refuse to use even for firewood.

This exhibit of fine furniture which somehow horned-in on the Washington flower show proved, according to many visitors, just as popular as the exquisite displays of flowers of many varieties. The only thing that was more popular, according to an admission of the Chief, was the lunch counter. "Just goes to show," he said, "that food is the most popular thing on our whole list of possessions and productions. I can't see how anyone could possibly fail to value very highly the beautiful floral displays at the 1950 Washington flower show. Neither can I understand how anyone can fail to value very highly the productive land that gives us our food, our exquisite flowers, and even the woods of which we manufacture thousands of useful articles."

For further details see the Chief's article, "Wasteful Habits," published in *SOIL CONSERVATION Magazine* in August 1948.

THE MYSTERY OF TRACE ELEMENTS

By JOHN R. HARNESS, JR.

MORE than 200 soil scientists and men and women of related interests gathered at Missouri University, Columbia, for a short course on "Trace Elements in Plant and Animal Life" early this year. This was the first such meeting to be held at the Missouri College of Agriculture and the attendance far exceeded the expectations of Dr. William A. Albrecht, head of the soils department, which sponsored the course. Among those attending were representatives of the fertilizer and farm-implement industries, Soil Conservation Service and college people, and a few farmers.

The trace elements are those which are in the soil in comparatively minute quantity. There are some 90 in all. Their importance undoubtedly is great but not well understood. As the major elements have been depleted, so, also, have the trace minerals. The lack of some of them may account for certain plant and animal diseases.

Some of the trace minerals known to be essential to plant growth are magnesium, manganese, boron, copper, zinc, and molybdenum. Cobalt has been found to be essential to man and animals but not to plants. It is only recently that cobalt has been classified as a part of that important new vitamin, B-12. Magnesium has been found to be a part of chlorophyll, the green coloring in plants, but it makes up only about 24 parts in 900 in the chlorophyll.

The soil, even in the virgin state, may not include all the elements. One soil may contain some minerals which are missing from another. Certain plants grow in such soils although they might do better if the trace elements were present.

Given a soil with proper trace elements, it seems likely that feeds such as corn could take up and store sufficient quantities of the elements to become a more complete feed. This might obviate the necessity for special feed supplements to furnish the needed elements and compounds in which corn is so deficient as to require supplementation.

NOTE.—The author is soil scientist, Soil Conservation Service, Bowling Green, Mo.

Information is meager. The discovery that some of the trace elements are essential was accidental and interesting. Boron, for instance, was found to be necessary for growing beans in water cultures. Beans would not grow until a little boron was added. And yet as late as 1905 boron was thought to be poisonous to plants. Today it is often added to soil to correct such conditions as yellowtop in alfalfa, stem crack in celery, and head discoloration in cauliflower. On the other hand, well water in parts of California carries too much boron. The problem there is to get rid of the boron or to grow crops that can tolerate large amounts. For example, sugar beets can stand much more boron than lemon trees.

In 1939 in water-culture experiments, molybdenum was discovered to be essential to plants. At first the discovery seemed of little significance. But today in a large area of Australia, as little as one-sixteenth to one-half ounce to the acre means the difference between worthless and good pasture land. Twenty-five cents worth of mineral adds as much as \$35 per acre to the value of the pasture.

Lack of zinc causes "rosette" in peaches. This condition may be found even where zinc is plentiful in the soil but not in a form available to plants. The condition is corrected by spraying the trees with zinc sulphate rather than applying zinc compounds to the soil.

The trace elements can do good only where they are needed, and just because they are needed in one place does not mean they are needed in others. As an example, one-half part of boron to 3 million parts of soil is needed by some plants; three parts to 3 million is poisonous!

Numerous reports indicate that the trace-mineral level in the soil and forage grown upon it influences the health of animals. Cattle in Holland diagnosed as anemic were found to be eating hay low in copper. Cattle in Florida were suffering from a disease known as "salt lick." They were on a soil which had 0.036 percent iron and 3.85 parts per million of copper. Where soil contained 0.42 percent of iron and 8 parts per million of copper the cattle remained healthy.

In Missouri, a study is being made of the possibility that brucellosis in cattle herds is related to the lack of some trace elements in the soil and feed. At present the scientists pursuing this study admit they are like fishermen casting their nets into the sea. They are hoping to draw in

new ideas and facts which can be put to use much as the information about boron was put to use.

Farmers can help greatly in adding to the available knowledge. Small-scale applications of minor elements in their own gardens or portions of their fields, and careful observations of the effect on livestock and crops, might well turn up some valuable clues. Trace or minor element deficiencies are usually spotty and the range is narrow between "too little and too much." For these reasons farmers should consult county agents, State agricultural experiment stations, and local Soil Conservation Service men for latest information before spending much money for "shot-gun" mixtures.

NOTES FROM THE DISTRICTS

PROFITS FROM POOR LAND.—Deep in South Carolina near Orangeburg is the 3,000-acre Millwood Farm of Edgar L., Jr., and Woodward D. Culler. The land has been in the family since about 1780, and the knowledge of the land has been handed down from father to son several times.

But one thing has Edgar Culler wondering: The white, deep sand that wasn't supposed to be worth farming made more money in 1949 than any other similar-size spot on the farm. The 39-acre field, planted in sericea lespedeza for several years in his program of soil conservation, made 600 bales of hay, supplied cattle with 1 month of grazing, and then yielded 10,100 pounds of clean, scarified seed. At 22 cents a pound, the seed brought a return of \$2,222.

Sericea last year received 800 pounds of fertilizer to the acre. And while adverse weather and the boll weevil played havoc with the cotton that covered about 40 percent of the farm, the weather was just right for sericea. Of the 1,275 acres in cultivation, the Culler brothers now have more than 100 acres in sericea.

Another 50 acres will be planted next year. And that, along with 70 acres of kudzu, will just about wrap up the white sand on Millwood Farm.

YIELDS UP.—Leonard Steenburg, Hartwick, N. Y., dairy farmer, observed the production John Kovac, his neighbor and chairman of the Otsego County Soil Conservation District, was getting from his contoured strips. So, when he bought a Cherry Valley farm, he called in the SCS technicians, had a complete conservation plan made, and started establishment. Although last summer's long drought cut production on his neighbors' farms, Leonard got an average oats yield of 48 bushels per acre, well above the average for grain raised in the neighborhood. His corn yields are up, too. His success is mainly due to contoured strip cropping, he says.

GRASS MUST BE NOURISHED.—Dr. W. F. Bushnell and Grover Fountaine, the owner and the operator of a 280-acre farm near Elk Point, S. Dak., do not agree with the adage "If the land won't grow anything else, seed it to grass." The brome-grass in their pasture neither gave the land much protection nor produced well until they treated it as a crop and fertilized it properly. Now, however, it gives the land excellent cover and yields abundantly.

Brome-grass was seeded on land not suited for cultivation, as provided in the farm's conservation plan—a plan developed in 1942 in cooperation with SCS technicians and the Sioux-Burle Soil Conservation District.

"Fertility was low and it has taken some time to get the grass going as it should," Fountaine explains. "We tried disking it, seeding sweetclover, and spreading barnyard manure, but without much result. Then we applied 35-percent nitrate fertilizer at the rate of 200 pounds per acre and got results. Before this was applied a dozen calves would keep the grass down. Afterwards, I pastured my whole herd of 30 head in that field.

"I suppose that the fertility of the land will be brought back in time to a high level because of the grass and the spreading of manure. But since grass uses a lot of nitrogen, it's my hunch that it'll continue to pay to use nitrogen fertilizer for a long time."

PROTECTING BEAUTY SPOT.—The Watkins Glen, N. Y., Chamber of Commerce is supporting the Schuler County Soil Conservation District in a program to protect the "Glen," New York State's famous beauty spot along Seneca Lake. With the assistance of other local, State, and Federal agencies they propose to establish all the conservation practices required to protect 20,000 acres in the Glen's watershed. Two hundred farmers are co-operating. The immediate aim is to control the flow of water through the Glen and stop the dumping of topsoil, rock, and gravel into the lake and its tributaries.

FOUR FARMS MOVE FORWARD.—Wayne D. Cook, Dillsburg, Pa., now has a conservation quartet—four farms, 470 acres, all under complete conservation farm plans. His fourth farm, just leased, received the 1,100th complete farm plan made in the York County Soil Conservation District.

Altogether, Cook has 160 acres cropland, 225 acres pasture, 31 acres long-term hay, and 24 acres woodland. The balance is in roads and homestead.

FARM SAFETY WEEK.—Just ahead is the busy harvest season when farm accidents reach the highest point of the year. This is the time to be especially careful with machinery and tools. Thousands of farm workers will be seriously injured or killed because of not following simple precautions in handling tractors and other machinery. Thousands more will be injured. Many districts plan to observe Farm Safety Week, July 23-29.

TO SEE IS TO KNOW.—To the Belleair elementary school in the Pinellas (Fla.) Soil Conservation District the study of soil and water conservation is not new. They've been at it for quite a while now. Recently they had a full-day exhibition to demonstrate the results of their study during the past year.

The Clearwater Kiwanis Club spent about \$500 in transporting children on field trips where they could see both the need for and the results of soil and water conservation.

COOPERATION.—Commissioners of the Yazoo County (Miss.) Soil Conservation District can rightfully boast of the help they received from various local groups. Take for example the 10-acre winter-grazing demonstration which the Agricultural Workers' Council is conducting. The Farm Bureau, Yazoo County Chamber of Commerce, and the Rotary Club jointly underwrote \$1,500 of the loan needed to establish and stock the project which is carried on for the benefit of local farmers.

DROWNING ACRES RESCUED.—Alex Hastillo, in the Tolland County (Conn.) Soil Conservation District, had 4 acres of wet land in the middle of an otherwise good field, which would not produce a crop even in the driest year. Jim Patric, SCS technician, worked out a plan to improve the situation. Hastillo laid one-quarter mile of perforated tile at a grade of 2 $\frac{3}{8}$ inches per 100 feet. The job was difficult because of the extreme care required in placing the stakes so that they would correctly guide the workmen in laying the tile at just the right grade.

The total cost was 38 cents per foot—only \$501.60—to remove water that would have filled a hollow 200 feet square and 4 feet deep. The ditch was dug with a back hoe. Four inches of gravel was placed in the bottom before the tile was laid. Then the ditch was refilled with more gravel.

The surplus water is carried to a farm pond, from which Hastillo draws irrigation water for other land. The system will serve for many years with little or no maintenance cost. With four more acres now in production, Hastillo calls his investment "dirt cheap."

BARGAIN DAYS.—To encourage farmers to make a special effort with bulldozers between June 15 and July 15, when they ordinarily are up to their necks in haying, supervisors in the Essex County (Vt.) Soil Conservation District have reduced the cash price for district bulldozer work from \$5.40 to an even \$5 per hour.

TILE DRAINAGE ACHIEVEMENT.—Another record: 22,000 feet of tile drainage have been installed in a 38-acre orchard on the E. E. Burns farm, Alton, N. Y. A combination of herringbone and random systems was used, outletting into an 8-inch main, 5 feet deep. Spacing varied from 25 to 100 feet, according to the drainage characteristics of the soil.

Technical assistance in survey, design, and installation was furnished by SCS technicians attached to the Wayne County Soil Conservation District.



VALUE CONFIRMED.—As a result of a questionnaire sent to readers of SOIL CONSERVATION Magazine in the Kingsbury County (S. Dak.) Soil Conservation District, “the supervisors of the district decided that it is a worth-while project to send out the subscriptions.” They are, therefore, sending subscriptions to all new cooperators, to public libraries, high schools, banks, newspapers, implement dealers, and certain other individuals, in addition to 41 renewals—altogether 138 subscriptions.

The expense is being borne by the following firms: Citizens State Bank, Arlington; Community State Bank, Lake Preston; Farmers and Merchants State Bank, Iroquois; Oldham State Bank, Oldham; Peoples State Bank, De Smet; Kingsbury County Farmers Union Cooperative, Lake Preston; Frank Kneip, Arlington; O’Keefe Implement Store, De Smet; De Smet Motor Co., De Smet; Tommy Williamson Co., De Smet; Kruse Implement Co., De Smet.

SUPERVISORS LOOKED AHEAD.—Farsightedness by the supervisors of the Santa Fe (Fla.) Soil Conservation District is making it easier for farmers to grow the legumes and grasses they need to hold and improve their soil. In 1944 they bought a combine—the first in the county—to be used by cooperators for saving blue lupine seed. Then, in 1949, they bought and began operating a combination seed cleaner and seed dryer—another first for the county.

During the first season, 210,000 pounds of blue lupine seed were processed. Then around 30,000 pounds of Pensacola Bahiagrass, worth 75 cents to \$1 a pound, were dried. A nominal charge for this service is paying for the equipment.

SEVENFOLD INCREASE POSSIBLE.—South Jersey’s pine barrens can be developed to produce seven times the amount of wood normally harvested, through such practices as prescribed burning, woodland thinning, and rotational harvest cutting. These practices, says Glenn Smith, SCS forester in South Jersey Soil Conservation District, will make it possible to cut the equivalent of 650,000 cords of pine annually, as contrasted to the 90,000 cords cut in 1946. The barrens are capable of growing 775,000 cords of pine in a year. The figures are based on studies made by the bureau of forest management, New Jersey State Department of Conservation and Economic Development.

OFFERS TROPHY.—Hugh D. Chamberlain, starting his ninth year as chairman of the Allegany County (N. Y.) Soil Conservation District, is offering a trophy to the farmer who makes the greatest contribution to soil and water conservation. It will remain in the possession of the winner for a year, or until a new winner is chosen. It becomes the permanent possession of a three-time winner. Requirements include establishment of a complete soil conservation plan on the farm. Participation in field days, conservation meetings, and demonstrations will help the farmer’s score.

12-YEAR EPIC.—Twelve years ago when the Soil Conservation Service assisted in the purchase of so-called submarginal land in the West Ottawa and Muskegon districts, in Michigan, there was considerable question as to what use would ever be made of the land and whether or not any immediate returns could be obtained. The land, purchased with LU funds for \$27,660, was leased to the districts on a long-time basis for management purposes, with SCS assisting in development. The West Ottawa district, in which most of the land is located, has received an income of \$13,214 to date or nearly 50 percent on the investment.

WOOD-LOT DEMONSTRATION.—Joe Murphy of Leeds, a cooperator in the Androscoggin Valley (Maine) Soil Conservation District, feels that “assistance SCS has given to me in my wood lot is the best thing that has ever happened to me.”

Fred Bell, Lewiston cooperator, who clear-cut part of his wood lot 6 years ago, says that if similar help had been available then “it would have saved me from ruining that part of my wood lot.”

After a discussion in an area where there had been a release cutting of hardwoods in an excellent hemlock stand, and a discussion of methods used in thinning and pruning a young stand of pine, 14 farmers went to work in a demonstration on the farm of Jim and Ralph Blanchard. For 4 hours, in zero temperature, they used axes, saws, and pruning tools in marking, thinning, and pruning a ¼-acre tract of white pine, 6 to 8 inches in diameter. With a good, clear “before” and “after” picture and actual working knowledge of how to do the job, they were ready for work in their own wood lots.

SEED CLEANER HELPS RANGE.—The New Helena (Nebr.) Soil Conservation District has cooperated with the Custer County noxious weed district in buying a portable seed cleaner and treater.

This equipment is now being moved from place to place as needed for the treatment of grass and legume seed and small grain. It is expected to stimulate grass seedings and bring about better land use and erosion control. It will also help to control noxious weeds by separating weed seeds from the others.

Previously, the only place in the county to get seed cleaned was at a seed house in Broken Bow where a small amount of custom work is done as a side line. Bringing the seed to Broken Bow means a long trip for many farmers and ranchers, so few use the facilities there.

THREE YEARS.—Three years ago, Walter B. Hutcheson, SCS technician, of the Orange Soil Conservation District, helped Gordon Eunice of Orlando, Fla., make a soil and water conservation plan for his dairy farm. Here's what has happened: The plan for the entire farm is completed. Capital investment has about doubled. Net farm income is more than 10 times the 1947 figure.

When Eunice launched his soil conservation plan with district help, his 25 acres of carpetgrass, supplemented by millet, oats, and rye caused feed bills to be high for his 200 dairy cattle, 120 of which were in lactation. Also, the Orlando dairyman found it necessary to buy all of his replacement animals from the north.

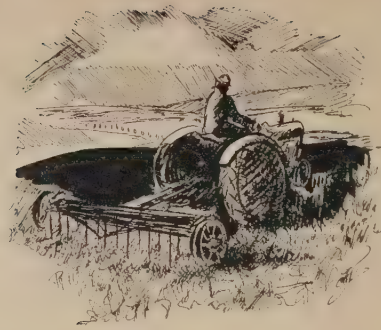
Of the 300 dairy cattle now kept, about 175 are being milked. Feed bill per cow is from 25 to 40 percent less than in 1947. More than that, Eunice now raises replacements for his herd.

Instead of the 25 acres of mediocre pasture, he has 200 acres of improved pasture. Here are some of the plants used singly and in combinations: Pangolagrass, Hubam clover, carpetgrass, white clover, common and Pensacola Bahiagrass, Dallisgrass, Kentucky 31 fescue, Coastal and "99" Bermuda-grass.

HISTORY HAS BEEN MADE.—C. M. Felts, principal of King High School in Stokes County, N. C., thinks that soil conservation "is now a definite part of American history." Felts, who owns a farm in Forsythe County, has become so interested in conservation farming since he worked out a plan for his farm with the Tri-Creek Soil Conservation District that he decided to take students in American history on periodic trips to his farm so they can see the progress being made in soil and water conservation. "I intend to give them credit toward their American history course for the time spent on the farm," he said, "because I am convinced now that soil conservation farming is a definite part of American history."



CLEARING THE WAY.—Austin S. Lamb, who farms at Ledyard, New London County, Conn., has just cleared 2 acres of "the stoniest land in Connecticut" at a cost of \$133 per acre. When the field is harrowed, fertilized, and seeded, Lamb and his two sons expect to have pasture for more than two cows per acre compared with one cow for 4 acres previously pastured. They will irrigate with water from a nearby stream. SCS technicians working with the New London Soil Conservation District laid out the work as part of Lamb's complete farm plan.



WISCONSIN PASTURE RESEARCH.—Renovated pastures at the Upper Mississippi Valley Conservation Experiment Station have yielded three times as much dry forage as straight bluegrass pasture.

All fields were limed and well fertilized, but the average bluegrass yield was less than 1 ton to the acre. Land with alfalfa, medium red clover, and brome-grass gave nearly 3 tons to the acre.

Runoff and soil loss were less in pasture renovated with a field cultivator. Land with an 18 percent slope and plow-cultivated, lost over 5½ tons of topsoil to the acre. Land renovated with a field cultivator lost about 40 pounds to the acre. Broken sod left on the surface by the field cultivator protected the soil throughout the season and saved more soil than on pasture untouched in straight bluegrass.

Overgrazing will reduce yields whether pasture is renovated or not, say the La Crosse experimenters. They found that moderate grazing on renovated pasture increased yields about 20 percent over heavily grazed pasture.

Most of Wisconsin's permanent pastures are relatively unproductive, say the researchers. But they will produce well with good treatment. Pasture deserves the same treatment as any other farm crop. In order to get the most out of any acre, it's best to fertilize the soil and put in productive seed mixtures. Well-managed pasture provides feed at lower cost than any cultivated crop, they say. This means more economically produced beef and mutton or cheaper milk in the pail.

PERSISTENCE WINS.—When the Massachusetts State Legislature enacted legislation authorizing towns to establish regulations over the removal of topsoil, as a soil conservation measure, Joseph Brown, director in the Plymouth Soil Conservation District wrote all town selectmen and sent them a copy of the law to call their attention to this enactment. Then he wrote a similar letter to each of the town clerks. Next he wrote letters to all of the town directors of the Extension Service. He's getting results. Six towns already have established regulations and half of those that remain are scheduled to take early action.

PINES PAY.—Ernie Boone, a Mississippi farmer getting SCS technical help through his soil conservation district, says, "I've cut over \$300 worth of trees from a 3-acre patch of pines within the last 5 years. The first cut was for pulpwood, removing scrub and defective trees; then I cut poles and piling; and this time I'm getting posts and still leaving a good stand to grow."

NEBRASKA TROPHY TO FOX.—Devotion to conservation beyond the requirements of his job has brought a coveted award to an SCS employee: Adrian C. Fox of Lincoln, Nebr., head of the regional education relations section. The award is the Dr. Herbert Kennedy Nebraska Conservation Trophy.

Fox won because of his development of pupil and teacher guidance material dealing with soil, water, and wildlife conservation, and other activities in conservation. He was sponsored for the award by the Lincoln chapter of the Izaak Walton League of America, an organization in which he has been active. He is a member of the board of directors and serves as chairman of the committees on conservation education and publications-publicity-public relations. He is in his third year as editor of the chapter's monthly publication.

Fox is also executive secretary of the conservation education committee of the Nebraska division of the Izaak Walton League of America and a member of the league's national committee on policies in conservation education.

In addition, he is president of the State's oldest conservation organization, the Nebraska Ornithologists Union, and of the Lincoln chapter of the Soil Conservation Society of America. He is also a member of the conservation committee of the American Nature Study Society.

First winner of the trophy was William C. Bloom of Lexington, Nebr., Dawson County superintendent of schools, with whom Fox had worked closely in introducing conservation education in the rural schools of his county.

By virtue of the award, Fox gains possession for a year of a silver loving cup that is nearly 3 feet tall, and permanent possession of a smaller trophy.

A trained biologist, Fox has been head of the regional education relations section since his return from the Navy in November 1945.

He entered the Soil Conservation Service in 1935 as biologist and forester at the Wolsey-Shue Creek demonstration project at Huron, S. Dak., one of the first to be established in the northern Great Plains.

KIWANIANS MOVE IN.—The Woodstown (N. J.) Kiwanis Club has presented to the supervisors of the South Jersey Soil Conservation District a request for assistance signed by 51 farmers in the Woodstown watershed. They want to control erosion and make better use of their land. The club is especially interested in preventing siltation and preserving the natural beauties of the lake at Woodstown. The supervisors are putting the project under way, reports Frank Cortelyou, SCS conservationist.

ONEIDA HITS 1,000.—Oneida Soil Conservation District has the honor of being the first New York district to sign its 1,000th cooperator. Walter VonMatt is applying this 1,000th plan at his 178-acre Lee Center farm near Rome where he has been operating for a year. Oneida, the third oldest operating district in New York, started business December 6, 1940, 2 days after its next-door neighbor, Madison district. Madison has nearly 900 co-operators. Allegany, third in line, has 852; Cattaraugus reports 817; and Wyoming, the oldest operating district in the State, is fifth with 767 cooperators.

CRIMSON RIBBON.—A 20-mile strip of crimson clover on the main highway from Eatonton to Madison, Ga., is one of the achievements of the Piedmont Soil Conservation District. This reseeding clover was sown last year on highway shoulders with seed donated by farmers of Morgan and Putnam Counties.

ASSOCIATION JOINS TEAM.—As the second objective in a three-point program, the Connecticut Forest and Park Association at New Haven is undertaking promotion of conservation education in schools and workshops.

A LA THRASHER.—Inspiration stemming from what he observed at the Thrasher farm face lifting near Frederick, Md., in 1948, has led Henry B. Watson, a newcomer in Carroll County, Md., to do a similar job on his 154-acre farm, Meadow Lands, near New Windsor.

Just a year ago, his son Brock Watson, now an Air Force cadet, plowed the first contoured furrow across the slope. Now the change in the style of operations has virtually been completed. Watson's accomplishments include 53 acres of contoured strip cropping, with sod waterways in all field depressions; 18 acres of perennial hay seeded to an alfalfa-orchardgrass mixture; ditches blasted in lowlands to drain wet areas; 15 acres of permanent pasture seeded to orchardgrass-Ladino clover mixtures; old roads and gullies closed; hedges removed to facilitate strip cropping; fences built on contour; and lime and fertilizer applied to all land on the basis of needs revealed by soil testing.

Additionally, he has built 1,600 feet of hard-surfaced road, remodeled his dairy barn to meet sanitary requirements, and started a herd with 27 head of Ayrshires. He is planning to add a dozen more cows as feed and pasture become available. His heaviest expenses were in barn and road work but, he says, the total cost is not prohibitive. Increased production per acre and lowered operating costs, he says, will soon pay for his conservation practices.

DAFFODILS ON THE CONTOUR!—Our unusual back cover, from a photograph by Dale Swartz, shows part of a field of 30 acres of daffodils in the N. Van Hevelingen Nursery, Oregon. The mountain peak in the background, center, is Mount Hood.

This nursery produces daffodil and other bulbs, roses, and similar nursery stock in large quantities and ships throughout the world. It is the first large nursery in its part of Oregon to adopt a complete soil and water conservation program. That part of the story is important for the reason that the nursery was contoured, terraced, and otherwise treated as a demonstration designed to interest nurserymen and farmers in doing likewise. It attracted wide interest. On March 1 farmers overwhelmingly voted in the East Multnomah Soil Conservation District, a district which, incidentally, includes the regional office of the Soil Conservation Service at Portland.

The daffodils in the picture are the large "King Alfred." Total area of the nursery is 180 acres.



